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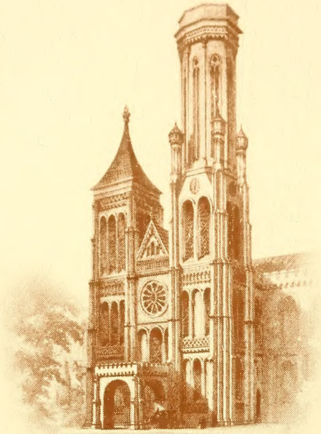

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IMMEDIATELY after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resultant given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

AT an expense of over $50,000 The Society sent a notable series of expeditions into Peru to investigate the traces of the Inca race. Their discoveries form a large share of our knowledge of a civilization which was waning when Pizarro first set foot in Peru.

THE Society also had the honor of subscribing a substantial sum to the historic expedition of Admiral Peary, who discovered the North Pole.

NOT long ago The Society granted $25,000, and in addition $75,000 was given by individual members through The Society to the Federal Government when the congressional appropriation for the purchase was insufficient, and the finest of the giant sequoia trees of California were thereby saved for the American people and incorporated into a National Park.

THE Society is conducting extensive explorations and excavations in northwestern New Mexico, which was one of the most densely populated areas in North America before Columbus came, a region where prehistoric peoples lived in vast communal dwellings whose ruins are ranked second to none of ancient times in point of architecture, and whose customs, ceremonies and name have been engulfed in an oblivion more complete than any other people who left traces comparable to theirs.

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LIFE ON THE GRAND BANKS

An Account of the Sailor-Fishermen Who Harvest the Shoal Waters of North America's Eastern Coasts

BY FREDERICK WILLIAM WALLACE

With Illustrations from Photographs by the Author

IT HAD been blowing a hard December gale for two days and the big liner was rolling and pitching enough to interfere with the comfort and equanimity of the thousand or more passengers aboard her. The few hardy ones who appeared at table bragged of their performance in lounge and smoking-room and opined it was quite a storm; the vast number of the prostrate vowed it was a hurricane.

In the lift of a squall of snow some one, peering through the great windows of the lounge, declared he saw a ship, a small schooner, close alongside. A rush was made for hats and wraps and the small party of those whom seasickness did not claim ventured out on the wind-and-spray-swept promenade deck to view the tiny craft which had the temerity to brave such winter weather so many miles offshore.

The writer happened to be coming home from Havre, and one glance at the schooner to windward served to recognize an old friend. She was a Bank fisherman, from Gloucester or Lunenburg possibly, and she was bound west for home, under heavy-weather canvas.

Passing within a cable's length of our rolling and wallowing leviathan, the little 100-ton schooner was storming along with a broil of white water shearing away from her sharp, round stem, and her reefed sails were as stiff and as white as marble, in the weight of the gale.

She would top a mighty Western Ocean gray-back with the graceful spring of a steeple-chaser, bowsprit pointing to the gray skies and red-painted underbody showing clean to the heel of the foremast; then with an easy plunge, like a porpoise diving, she leaped over the cresting surge and drove down into the trough with but the masts and upper parts of the sails showing above the bluey-green of the combers.

"She's a yacht," remarked some one admiringly.

"Pretty daring yachtsmen to be sailing in that little vessel so far out on the ocean," commented another.

WHAT THE SEAMAN MEANS BY "SAILOR"

"They're *sailors* aboard that craft," observed a business man to the grizzled chief officer, who had been cajoled from his watch below by the sight.

"Aye," he returned slowly, "they're sailors all right. She's an American fisherman homeward bound." And he stared at her for a minute or two, until she vanished in a flurry of snow.

In this age of steel hulls and steam and motor propulsion, the term "sailor" is often misapplied. All who are em-

Photograph from Phelps Studio

HOME FROM THE GRAND BANKS

The fishing industry along the North Atlantic seaboard is as old as the colonial history of the continent. The fisheries rights on the Grand Banks and along the shores of Nova Scotia and Newfoundland were the subject of diplomatic negotiations between the United States and Great Britain for more than a century and a quarter and were only finally settled by The Hague Tribunal in 1910.

Photograph from Phelps Studio

IN THE HARBOR AT GLOUCESTER

Within a few years after the landing of the Pilgrim Fathers, Gloucester had become the pioneer fishing port of the New World and a "nursery" for stalwart seamen of the American Navy—the men whose descendants were to make history under such leaders as John Paul Jones, Perry, Lawrence, Bainbridge, and Decatur.

Photograph by Herbert B. Turner

FISHING CRAFT AT GLOUCESTER

At the beginning of the Revolutionary War, Gloucester was second only to Marblehead as a fishing port. The industry suffered a blow during that period from which it did not fully revive until the Civil War.

ployed at sea on board a ship are called "sailors" by landsmen, but seamen narrow the embrace of the term down to those who can steer, equip, repair, and handle the canvas of a sailing craft under sea conditions. All others are deck-hands and seamen.

Sailors of the orthodox class even go a step further and designate all the personnel of a steamer as "steamboat-men." They consider the terms "seamen" and "sailor" to be sacred to ships driven by wind and canvas.

It has been my privilege to sail and steam the oceans in many kinds of craft, ranging from the romantic full-rigged clipper ship to the oil-burning greyhounds of twenty-knot speed, and from the graceful, sea-kindly Grand Bank fishing schooner to the sturdy steam-trawler of North Sea type; but in all my voyaging I am inclined to the belief that the only real "sailors" we have today, in this mechanical age, are to be found in the Bank fishermen of North America's Atlantic coasts.

The sailors I refer to are the crews of the beautiful fishing schooners that sail out of the fishing ports of Newfoundland, the Maritime Provinces of Canada, and the New England States of America; and the ports which claim most of them are Lunenburg, in Nova Scotia, and Gloucester and Boston, in Massachusetts.

These deep-sea fishermen are a distinctive type peculiar to the North American Atlantic coast. Racially they are from the sturdy pioneer breeds of Highland Scotch, Hanoverian German, West Country English, and West Irish which settled in Newfoundland, eastern Canada, Maine, and Massachusetts when America was young. Landing on the shores of the new land, they made their homes above tide-water and farmed, cut timber, and fished. To reach their markets they had to use the sea, and they built their own vessels to transport their goods.

The succeeding generations of men were, therefore, farmers, fishermen, woodworkers, and sailors.

In the New England States this type succumbed to the development of other industries. Its representatives deserted the seaside farms and went west or into the cities, where life was less arduous.

Nowadays, the men who built and sailed the American sailing marine of 1800 to 1862; who made of Gloucester, Boston, Portland, Provincetown, New Bedford, and Nantucket the great fishing and whaling ports of America having disappeared, their places have been filled by those of their breed who have succeeded in resisting the allurements of the shore industries and the cities.

These latter are the Nova Scotians and Newfoundlanders, and they form the greater part of the crews of the Bank fishermen, with a sprinkling of Scandinavians, Portuguese, and native-born Americans. Thus it is that when a Gloucester fishing schooner is lost, mothers and widows in Newfoundland and Nova Scotia remain to mourn the majority of the vessel's dead.

Photograph by Herbert B. Turner

ALONGSIDE THE GLOUCESTER DOCKS

During the first half of the nineteenth century, the heyday of the American sailing marine, Gloucester, Portland, Boston, Provincetown, New Bedford, and Nantucket were the great fishing and whaling ports of the United States.

THE SEA IS BEFORE HIS EYES FROM INFANCY

Physically, your American deep-sea fishermen are strong-muscled and able to endure hardship. They are not slum or city products, but are mainly raised in sea-coast villages of the Canadian provinces and Newfoundland.

At an early age they learn to handle an axe, to work on the land, and to rig and bait fishing gear. In the summer months the boys usually go shore-fishing or lobster-trapping. The sea is before their eyes from infancy; the roar of it in their ears and the smell of it in their nostrils.

Clean air, good, wholesome food, and hard work create a sturdy, hard-muscled youth who usually breaks away to sea in a Bank fishing vessel ere town lads are through grammar school. When he knows enough to "hold his end up" in a dory and aboard a fishing schooner, he makes for Boston and Gloucester, attracted by the good money made in Amer-

"ALL HANDS TO THE MAIN-SHEET"

The fishermen practically live in oilskins and rubber boots while at sea.

SAILS SPREAD FOR A RUN TO THE GRAND BANKS

ican vessels and the broader allurements of shore recreations in large ports.

Some few marry and settle down in American fishing ports, but the majority keep in touch with their birthplaces and journey home once or twice a year.

BOTH FARMER AND FISHERMAN ARE WEATHER GAMBLERS

Ashore, the Bank fisherman is not conspicuous. He talks, acts, and speaks pretty much as any other class of American worker. He is neither ignorant nor uneducated, nor does he interlard his speech with nauticalisms or wear his sea-boots and oil-skins when strolling uptown. The average deep-sea fisherman of today is merely a healthy, level-headed, intelligent class of skilled worker who regards his particular vocation pretty much as the farmer does his, and the two are much akin. Both are gamblers, with livelihoods dependent upon the weather.

But it is at sea that the Bank fisherman manifests his distinctiveness, and the splendid inherited qualities of the type are seen to advantage—daring, initiative, skill in seamanship, and ability to endure long hours of heavy labor and the rigors of seafaring in small vessels during the varying conditions of weather on the North Atlantic.

It may be said that he is no different from the European fisherman in this respect; but comparisons will show considerable differences. The deep-sea fisherman of Europe has practically outgrown sail, and works on powerful steam-trawlers, where ability to run a winch, haul and heave a trawl-net, use a netting needle, and dress and box fish are practically all that is required of him. On the few sailing smacks operating nowadays in European waters the trawl-net is also used as well as hook and line and drift-net. All the work is done on board the vessel.

DORY FISHING MAKES THE AMERICAN DISTINCTIVE

In the North American fisheries the fast-sailing and sea-worthy schooner still remains as the prime means of producing fish from the Western Atlantic "banks," and the greater part of the fishing is done from small boats, known as dories, which are carried by the schooner and launched upon the fishing grounds.

It is this dory fishing which makes the American fisherman, and by that term I include Canadian and Newfoundlander, a

SPEEDING FOR MARKET: A BANKER IN WINTER RIG

"The modern Bank fishing-schooners are undoubtedly the handsomest commercial sailing craft afloat. They are built of wood and range from 100 to 150 feet in length, with a tonnage of from 80 to 175 tons."

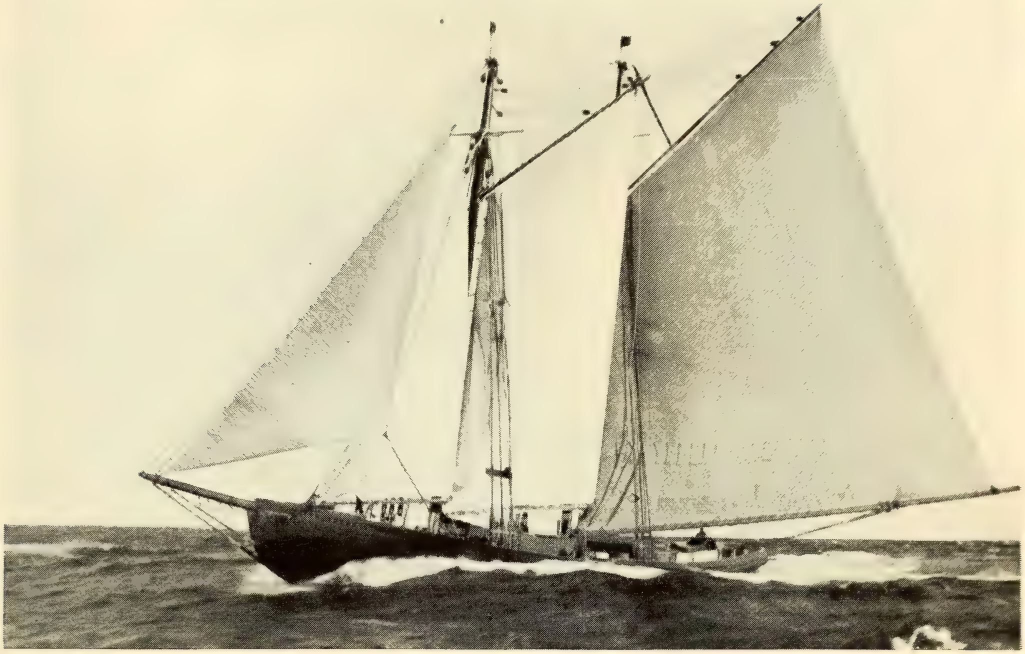
distinct type from his colleagues in other countries, and adds to his vocation a hazard and labor which calls for certain sterling qualities to surmount.

It is a peculiar fact that the North American fisherman, of all white fishermen, has stood out longest against modern innovations in fishing methods and equipment. In Europe, years ago sailing smacks and hook and line were discarded for the steam-trawler and drifter. The trawler of steel construction, propelled by steam or motor, has only been used in the American fisheries of late years, and at present there are about sixty of these craft on this side compared to the thousands in Europe.

But while backward in changing over to steel and steam, our fishermen have evolved a type of sailing schooner which is the last word in weatherly qualities and speed under sail, and the men who man these vessels are the only real sailors left in this age of steam.

THREE KINDS OF BANK FISHERIES

There are three distinct fisheries in which the schooner fleets of the Western North Atlantic are employed, namely, fresh fishing, salt fishing, and halibut fishing. Mackerel seining also employs a schooner fleet during the season, but this is not a Bank fishery in the accepted sense of the term.



A BANKS FISHING-SCHOONER

In European waters fleets of steam trawlers supply the fish markets, but in the North American fisheries the fast-sailing, seaworthy schooner is still mistress of the Grand Banks.

As most people know, the Banks are vast areas of shoal water lying at various distances off the eastern coasts of the United States and Canada and south and east of Newfoundland. Upon these Banks, in depths ranging from 15 to 200 fathoms, tremendous numbers of certain demersal species of fish are to be found at various seasons. Cod is the commonest variety caught; haddock ranks second, while hake, pollock, cusk, halibut, skate, whiting, catfish, wolf-fish, monkfish, and lumpfish are also marketed.

FISHING WITH A LINE NEARLY HALF A MILE LONG

In the offshore fisheries upon the Banks, none of these fish are caught by net unless by steam trawling. In the schooner fishery the long-line, misnamed "trawl" by fishermen, and hand-line are used exclusively.

The long-line is, as its name implies, a long line, ranging from 2,100 to 2,400 feet in length, and is made of thin, but incredibly strong, tarred cotton.

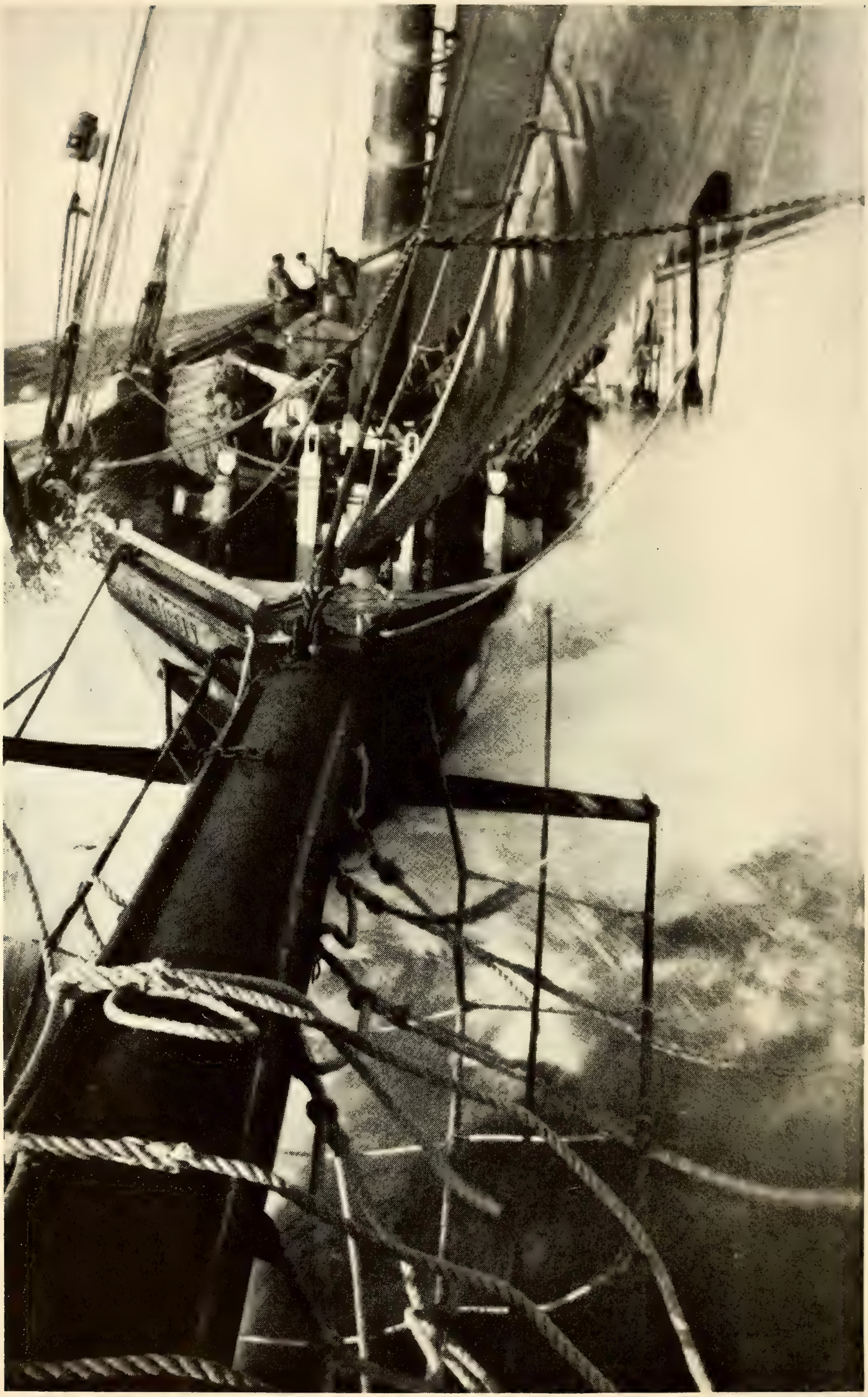
Into this "back line," or "ground line," are spliced thinner lines, called "snoods" or "gangens," at thirty- to forty-inch intervals. These snoods are usually from twenty to thirty inches long, and a strong steel hook is bent to each. Thus, on each long-line there are from 600 to 800 snoods and hooks.

Each long-line is coiled down in a wooden tub—often made by the fishermen themselves by cutting down a flour barrel—and every hook has to be baited before the "gear" is set.

In halibut fishing a much heavier line and hook are used, and as the snoods are spliced or bent into the ground-line at lengthier intervals, there is consequently a lesser number of hooks affixed to a coil of halibut gear.

THE ACTUAL FISHING IS FROM THE DORIES

Halibut line is not coiled down in tubs, but secured, when not in use, by a small square of canvas from which four pieces of short rope depend. The coil is placed upon the canvas and the ropes are used to lash the gear up in a compact bundle, the whole being called by fishermen "a



SIXTEEN KNOTS IN A DECEMBER BLOW

The photograph was taken from the bowsprit of an American fishing-schooner a few moments before it became imperative to reduce sail.

skate of halibut gear" in contradistinction to "a *tub* of cod or haddock trawl."

On every Bank fishing-schooner, except hand-liners, on which the fishing is done from the deck, a number of flat-bottomed, high-sided boats, called "dories," are carried. These dories are from 18 to 22 feet over all and their thwarts are removable, so as to permit their being "nested" one within the other upon the schooner's decks when not in use. From six to twelve of these dories are carried by fishing schooners, and it is from the dory that the actual fishing is done.

The modern Bank fishing-schooners are undoubtedly the handsomest commercial sailing craft afloat. They are built of wood and range from 100 to 150 feet in length, with a tonnage of from 80 to 175 tons. Their lines are fine and designed for speed, but weatherliness has been so well combined in the model that neither quality has been sacrificed. True, they are terrible craft for jumping about in a breeze and sea, but they seldom ship any heavy water on deck during a blow, unless "knocked down" or "tripped up" by squall or irregular wave.

Well-ballasted and drawing a lot of water aft, the Bank schooner stands up to a great spread of sail, the main-boom in some vessels being 75 feet long. The big mainsail is the largest piece of canvas on a fisherman and it is carried until the whole strength and skill of twenty to twenty-five men is required to make it fast in a strong breeze.

A CLOUD OF CANVAS IN SUMMER

The orthodox Bank schooner is two-masted—there have been three-masters—and the sails carried are mainsail, foresail, forestaysail, or "jumbo," and jib. These are known as the four "lowers."

In summer, when the topmasts are up, light sails are set, consisting of fore- and main gaff-topsails, a rectangular main-topmast-staysail, and a balloon-jib or jib-topsail. The two latter are often of great size, and when a Banker has her light sails set she is a veritable cloud of canvas.

In winter fishing, the light sails are left ashore and the topmasts are also discarded. In heavy weather, which will not permit a reefed mainsail to be set, a small triangular piece of canvas, known as the "riding sail," or storm trysail, is hoisted on the mainmast. This sail is also set to steady the vessel while lying to an anchor on the Banks or when making short "shifts" from berth to berth on the fishing grounds. When under riding-sail, foresail, and jumbo, a schooner is said to be "under Bank sail."

EVERY BANK SCHOONER IS A SEAFARING DEMOCRACY

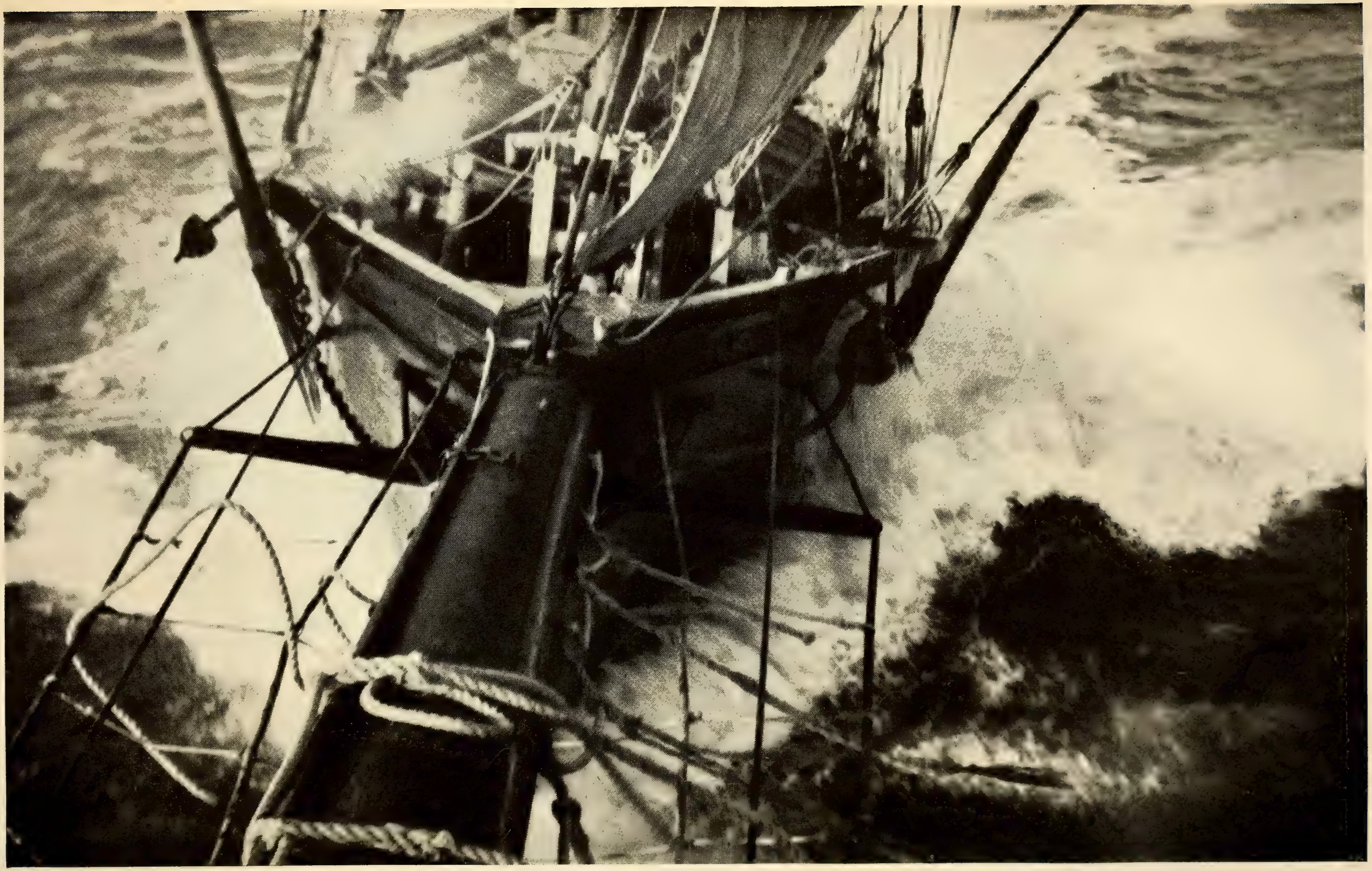
Every Bank fishing schooner is a sort of seafaring democracy. The crew works the ship on a coöperative basis, with the skipper as sailing and fishing "boss." In Canadian and American craft in which the writer sailed, the gang were shipped on the share system, their remuneration consisting of an equal share of the proceeds of the catch after the bills for victualing, ice, salt, bait, cook's wages, and other incidentals had been paid.

The schooner took a quarter or a fifth of the gross stock, and this repaid her owner for the hire of the vessel. Out of this share came the cost of insurance and upkeep, but in good seasons, prior to 1914, many schooners paid their cost of construction within twelve months. In those days, however, a Banker could be built for $12,000; nowadays they cost nearly $50,000.

The share system has had many variants. Formerly, in some vessels, it was "even shares," where all hands drew the same amount. In other craft it was "by the count," where each dory kept count of the number of fish caught and the dory catching the greatest number drew the highest share. The lucky dory was known as the "high line" or "high dory"; the lowest count was "low dory," and in some ships if a pair of fishermen came "low dory" too often they were "fired."

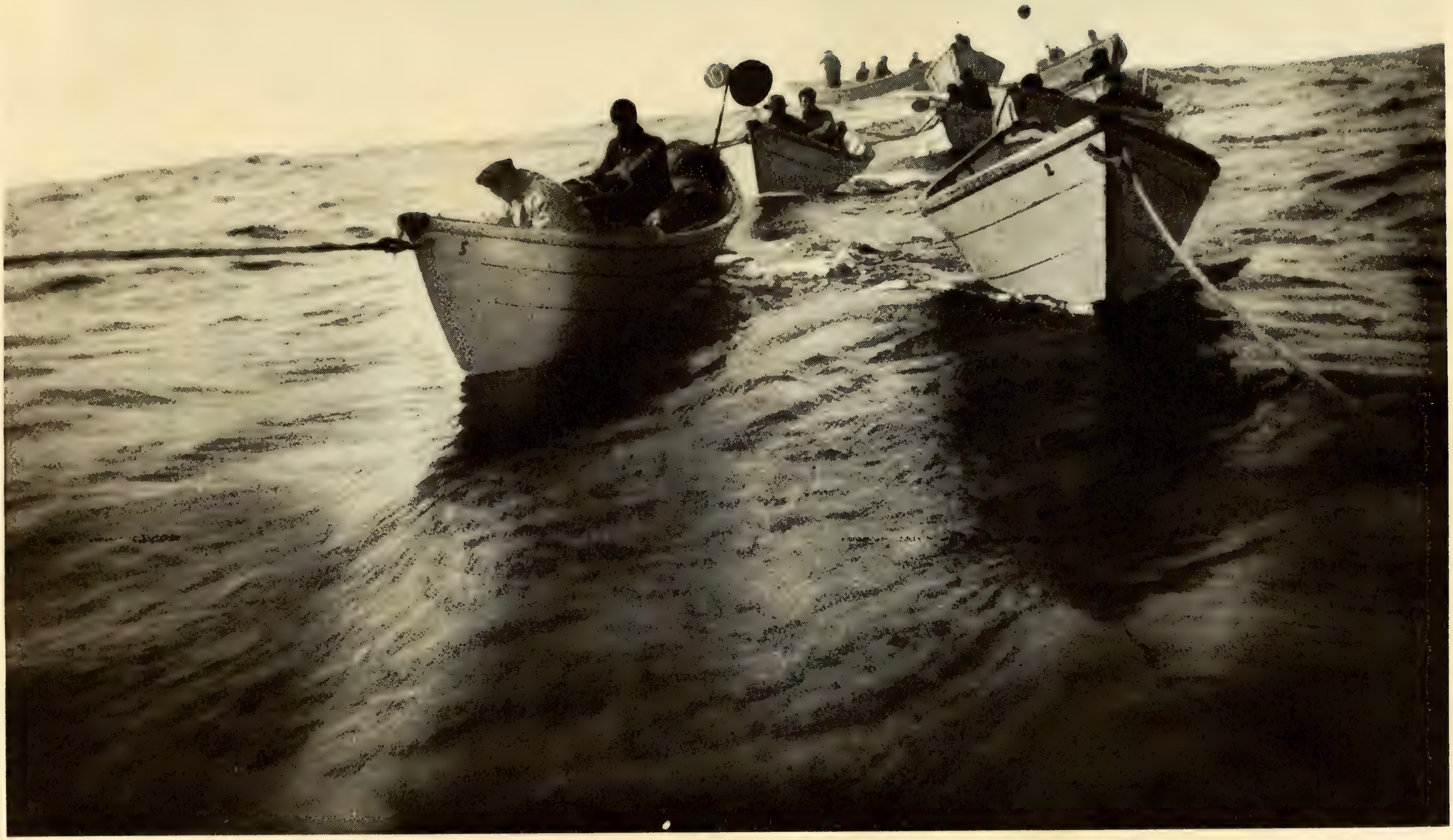
Both of these systems had their drawbacks, and of late years so many new methods of dividing the proceeds of the catch have been instituted in the different vessel fisheries that it would be confusing, and possibly erroneous, to quote any one as being the standard.

In some vessels a wage is now guaranteed and augmented by a share; in others, the owner provides food and gear and the fisherman provides nothing. But the share system, in some form or another,



FROM THE END OF THE BOWSPRIT: LOGGING SIXTEEN KNOTS IN A DECEMBER BLOW

A second view of the same schooner shown in the illustration on page 10. In the Grand Banks fleet it is a matter of pride with the skippers not to reduce the spread of canvas until the safety of the schooner absolutely demands it.

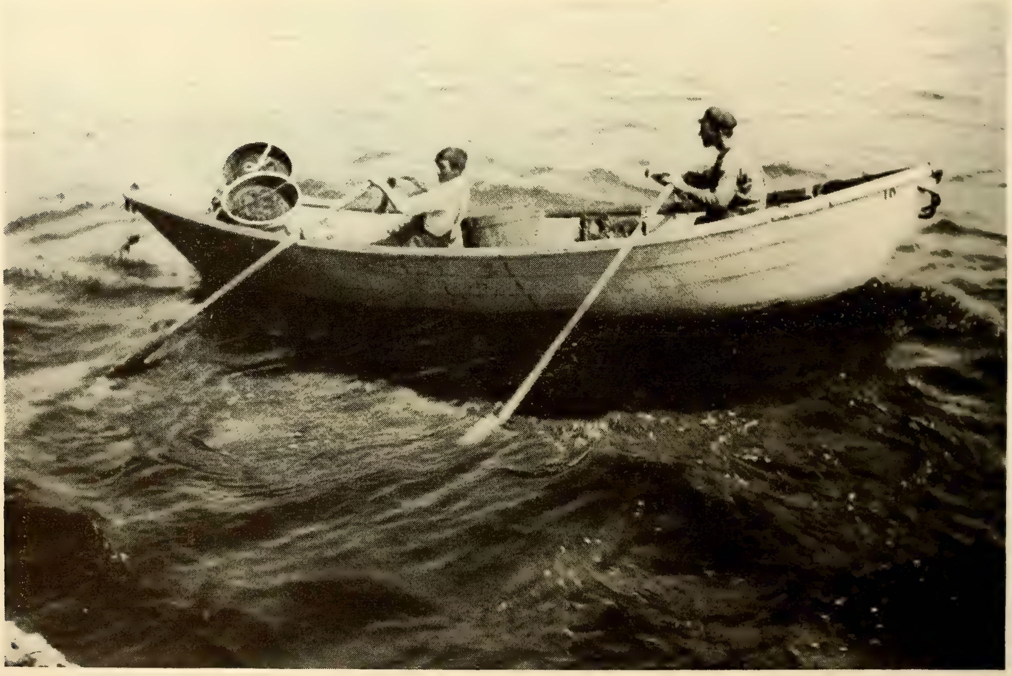


"FLYING SETS" ON THE BANK

The dories are being towed by the schooner. The black disks are "high-flyers," or "black-balls," which are affixed to the buoys attached to the fishing lines, as markers (see text, page 20).

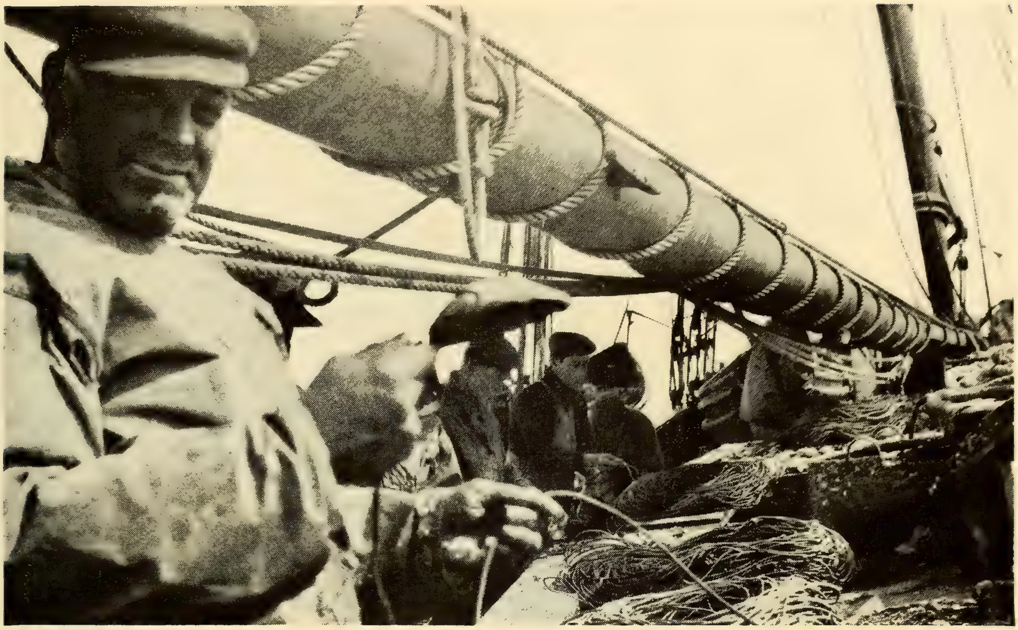
DORIES ON THE BANK

The next dory is barely discernible to the right, in the distance. Sometimes they are strung out behind the parent schooner for five miles.



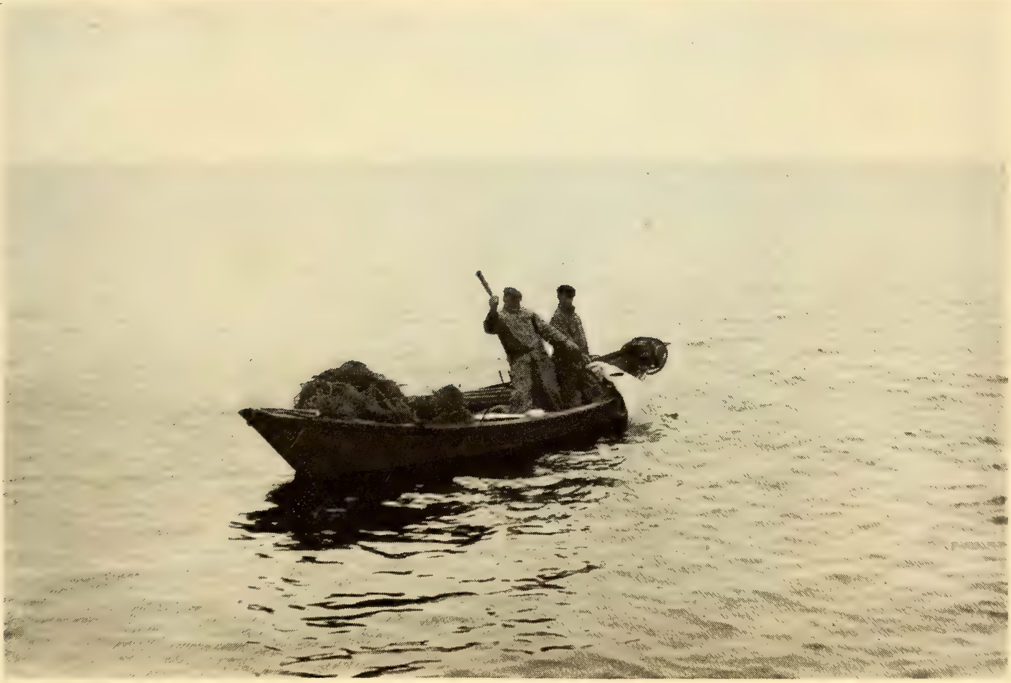
A DORY COMING ALONGSIDE THE SCHOONER

The tubs in the stern contain the long-lines (see text, page 9).



BAITING HALIBUT LINES WITH FRESH HERRING

There are three kinds of fisheries on the Banks—salt fishing, fresh fishing, and halibut fishing (see text, page 8).



CLUBBING A HALIBUT

This fighting fish must be clubbed before it can be taken into the dory.

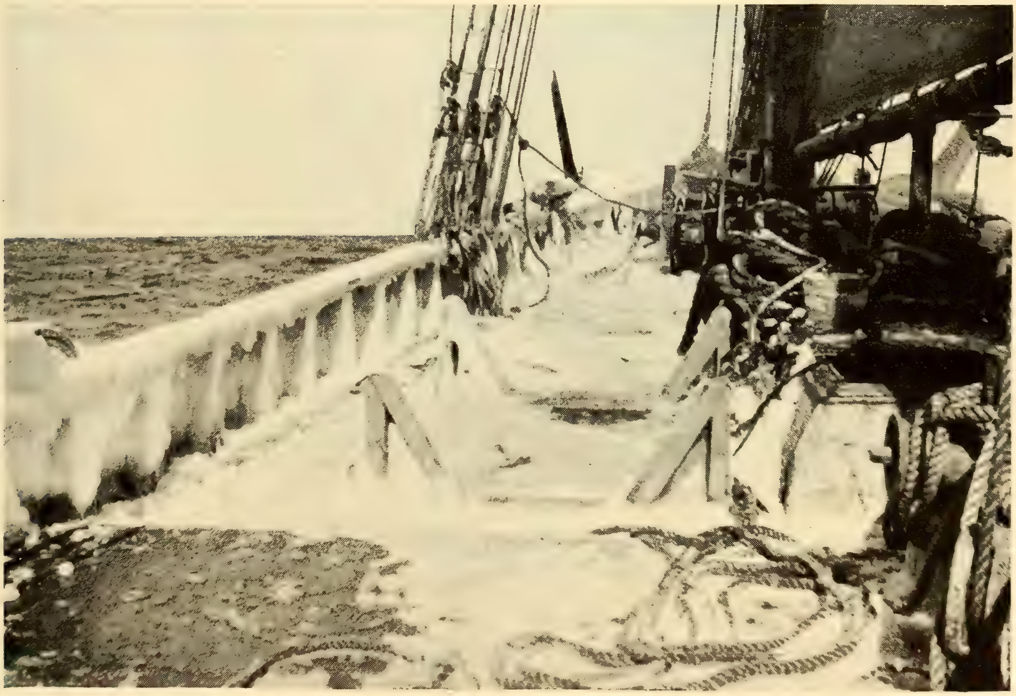
TORN TO RIBBONS

A forestaysail, or "jumbo," which was carried away in a squall.

REPAIRING A TORN SAIL

GETTING UNDER WAY IN WINTER

A schooner sometimes becomes so coated with ice that it is in danger of foundering.



IN WINTER, WHEN THE DORIES ARE OUT ON THE BANKS

MUZZLING A JIB IN A SQUALL

In winter weather, fishing can be carried on only in the lulls between squalls. At this season schooners are stripped for heavy weather, topmasts and light sails being left ashore.

still remains, as no orthodox fisherman would work in any other way. They are all born gamblers and always look forward to the "big trip."

I have been on voyages where the men drew $70 each for a week's work, and on others where they made but $45 in two months. The Goddess of Luck has something to do with the fisherman's remuneration, but the men who fish steadily throughout the year with hard-working skippers usually make a good income, though it is never commensurate with the risks they take.

The crew, or "gang," of a Banker runs from sixteen to twenty-five men. A schooner "running ten dories" would have a crew sufficient to man ten dories with two fishermen in each. In addition to these twenty men, there are the skipper, the cook, a deck-hand, and, if the vessel is an auxiliary, an engineer. In some vessels neither deck-hand nor engineer is carried.

NO FAVORITES ON A BANK SCHOONER

All navigating is done by the skipper. The men are primarily fishermen, but they are under the skipper's orders and must help to sail the vessel, to steer and keep a lookout, and to set and furl sail.

On passages to and from the Banks, the fishermen take regular turns in standing a watch at wheel and lookout. With a gang of twenty men and two men to a watch, this period is not a very long one, as a rule, but in bitter winter weather, with a hard breeze blowing, an hour at wheel and lookout is long enough. I have known times when ten minutes at the wheel required relief to thaw out fingers and toes numbed with zero frost.

When sail has to be set or made fast, all hands are called. If the men are asleep and it is only a small job that requires four or five hands, the whole crowd is turned out to do it. By doing this, no favorites are made and no one can complain that he is being imposed upon. I have seen twenty men roused from slumber to take in a jib—a job three fellows could have done—and the skipper saw to it that no man loafed below.

During the run-off to the "grounds" the fishermen are busy overhauling their

A BIG COMBER

The Bank fishing-schooner will make "good weather" of a hard gale and mountainous sea.

fishing gear. Each man has his dory-mate and his particular dory and they divide the work between them. It is incumbent upon them to have their lines in good shape and their dory properly equipped when the skipper sings out, "Bait up!", the schooner having reached the Bank to be fished.

Six to eight tubs, or skates, of gear have to be kept in order and baited by the two dory-mates—a task which calls for much skill and deftness of fingers, when some 2,000 hooks have to be baited with pieces of herring, squid, or capelin every time a "set" is made.

THE SOUNDING LEAD IS THE SKIPPER'S OTHER EYE

The passage to the Banks may be a run of from fifty to five hundred miles and it is usually made in the quickest possible time.

When the vessel has run her distance, the "spot" the skipper has been making for is found by the lead. The sounding lead is a fishing skipper's other eye and he is usually an adept in determining his position by means of it.

While there are many fishing captains who can navigate by solar and stellar observations, yet the majority find their way about by dead-reckoning, using compass, chart, log, and lead, and their accuracy is often startling.

The sample of the bottom brought up by the soap or tallow on the lead and the depth of water give most skippers an exact position after two casts.

If the gear has been baited and the weather is favorable, the skipper sings out, "Dories over!" The dory-mates who hold the two top dories on the port and starboard "nests" prepare their boats for going overside by shipping the thwarts and jamming the bottom-plugs in.

Oars, pen-boards, bailer, water-jar, bait-knife, gurdy-winch, bucket, gaff, sail and mast, and all other boat and fishing impedimenta are placed in each little craft, and it is swung up out of the nest and overside by means of tackles depending from the fore and main shrouds.

SETTING THE LINES

Two fishermen secure their tubs of baited lines and jump into the dory, which

THE WINTER GULLS

In winter, the gulls surround the fishing vessels by hundreds. During the summer they are not so common.

is allowed to drift astern. The painter is made fast to a pin in the schooner's taffrail and the dory is towed along by the schooner. As the other dories are launched, they are dropped astern, made fast to each other, and towed by the schooner (see illustration, page 13).

When all the dories are overside, the skipper, at the wheel of the schooner, determines the direction in which he wants to set his lines, and the dories are let go, one at a time, as the vessel sails along. A schooner "running" ten dories will have them distributed at equal distances along a four- or five-mile line and Number One dory is often out of sight from the position of Number Ten.

When the last dory has been dropped, the skipper will either "jog" down the line again or remain hove-to in the vicinity of the weather dory while the men are fishing.

In the dories, when the schooner has let them go, one fisherman ships the oars and pulls the boat in the direction given him by the skipper, while the other prepares the gear for "setting."

The end line of the first "tub" of baited long-line is made fast to a light iron anchor to which a stout line and buoy-keg is attached. This is thrown over into the water, and the fisherman, standing up in the stern of the dory with the tub of long-line before him, proceeds to heave the baited gear into the sea by means of a short stick which he holds in his right hand.

With this "heaving stick" he dexterously whirls the coils of line and hooks out of the tub and the long-line goes to the sea-bottom.

Three or four tubs, the lines joined together, may be set in this fashion, and another anchor and buoy is made fast to the last end. The long-line now lies on the bottom of the sea and is prevented from drifting or snarling up in bottom or tidal currents by the anchors at each end.

The fishermen in the dory hang on to the last anchor until it is time to haul the gear, or they may leave it altogether and pull back aboard the schooner again, leaving the location of their lines to be marked by a flag or "black-ball" thrust into the buoy-keg attached to the anchors at each end.

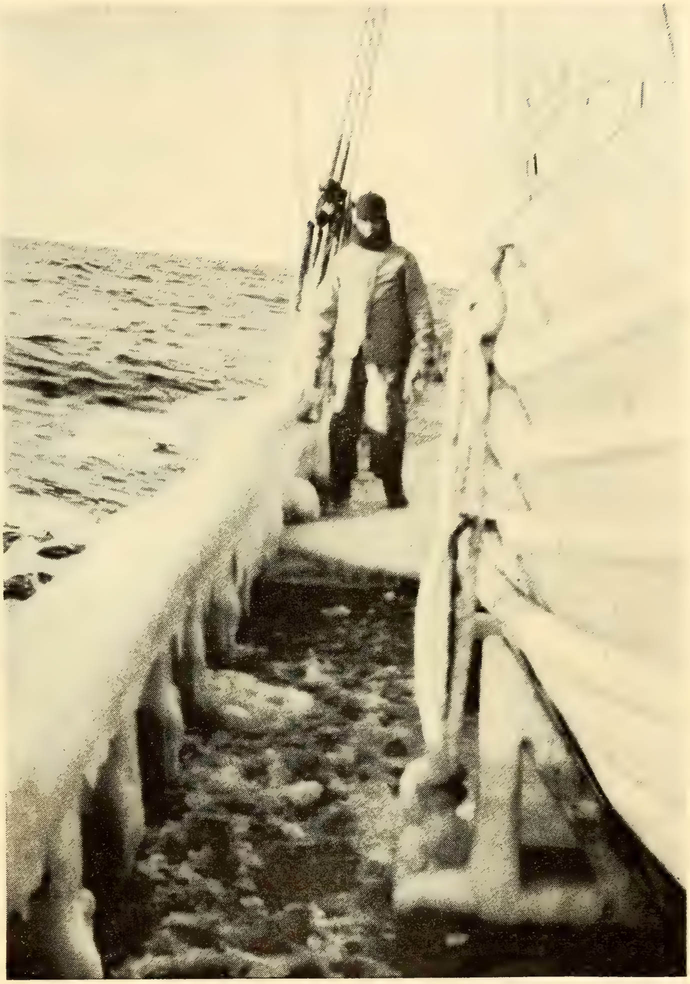
READY FOR THE HAUL

The lines may be "set" for periods varying from thirty minutes to half a day. In the latter case the fishermen will be towed back to their gear again by the schooner and cast adrift when the buoys marking their respective lines appear in sight.

The picking up of these tiny buoys and flags, scattered over five or six miles of ocean, is quite a knack, and the fishing skippers seem to possess an uncanny sense of location in finding them. The writer has known schooners being forced to leave their gear in the water and run to port for shelter in gales of wind, and to return two or three days afterward and pick it up again without much trouble.

When ready to haul the long-line, the fishermen insert a lignum-vitæ roller in the gunwale of the dory and pull the anchor and buoy up.

The end of the line fast to the anchor is detached and the fisherman, standing in the bow of the dory, commences to haul the long-line out of the water. His dory-mate stands immediately behind, and as the line comes in it is his job to coil it back into the tub again after knocking off the untouched bait.


A NEST OF DORIES AND BULWARKS COVERED WITH ICE

The fisherman hauling the line over the roller disengages the caught fish by a dexterous twist of the arm. This backhanded jerk whips the hook out of the jaws of the fish and it flops into the bottom of the dory. Fish which cannot be cleared in this manner are passed on to the man at the tub, who twists the hook out by taking a few turns of the snood around the "gob stick," which he thrusts into the mouth of the fish.

A VOLLEY OF "SLATS" MEANS POOR HAULS

Unmarketable species—sculpins, skate, dogfish, etc.—are knocked off into the sea by a vicious slat against the dory gunwale. On a quiet summer's day there is no more disheartening sound to a fishing skipper than to hear a continuous volley of "slats" coming from the line of dories. It means that the dogfish are swarming on the grounds, and that they have taken the hooks intended for better fish.

When the lines have been hauled and the last anchor is up, the fishermen row or sail down to the schooner, which is generally hovering around like a hen keeping guard over her chickens. The dory rounds up alongside the vessel, the painter is caught by some one aboard her, and, after handing up their tubs of long-lines, the two fishermen pitch out their fish upon the schooner's decks.

A PEN OF CODFISH ON A SCHOONER'S DECK

At the end of the day in the dories the work of "dressing down" the catch begins (see text on this page).

Certain sections of the deck have been penned off for the reception of the catch, which prevents the fish from sliding to leeward when the schooner rolls.

THE JOB OF DRESSING DOWN THE CATCH

At the end of the day, when all hands are aboard, the work of "dressing down" the catch commences. The fish are split and gutted, and some species are beheaded, by the fishermen, standing at tables rigged up on deck. The dressed fish are then washed in tubs of salt water and consigned to the hold, where they are packed away on chopped ice.

If the vessel is salt-fishing, the fish are piled upon each other in the hold-pens and liberally covered with coarse salt.

After the catch has been cleaned and stowed away, the men bait up their gear for the morrow's "set." If the fish are biting freely and the catch is heavy, the fisherman's day is a long one. Dories will often be swung overside before sunrise and the men will finish by midnight.

There is very little sleep to be got on the Banks when the weather is fine and the vessel is "on fish," and the writer remembers one occasion in winter fishing on a market fisherman where the gang were kept hard at it from Sunday night to Thursday morning with but an hour's sleep each night. On Thursday a gale of wind came along and it was hailed with pleasure, as an opportunity to "lay off" and catch up on slumber.

FOG, THE FISHERMAN'S WORST ENEMY

The foregoing description is that of the life on a market or fresh-fishing schooner running her catches to port for consumption in a fresh or smoked state.

The "marketmen" seldom remain at sea longer than ten days, but life aboard these craft demands the greatest skill and hardihood on the part of skipper and crew. They waste no time in getting to the fishing Banks, and usually go tearing out under a press of sail. Dories are hoisted over before dawn, and the men often fish all night, with torches aflare on the dory gunwales. They will go overside in pretty rough weather and will remain out until the last minute, in the face of fogs and squalls.

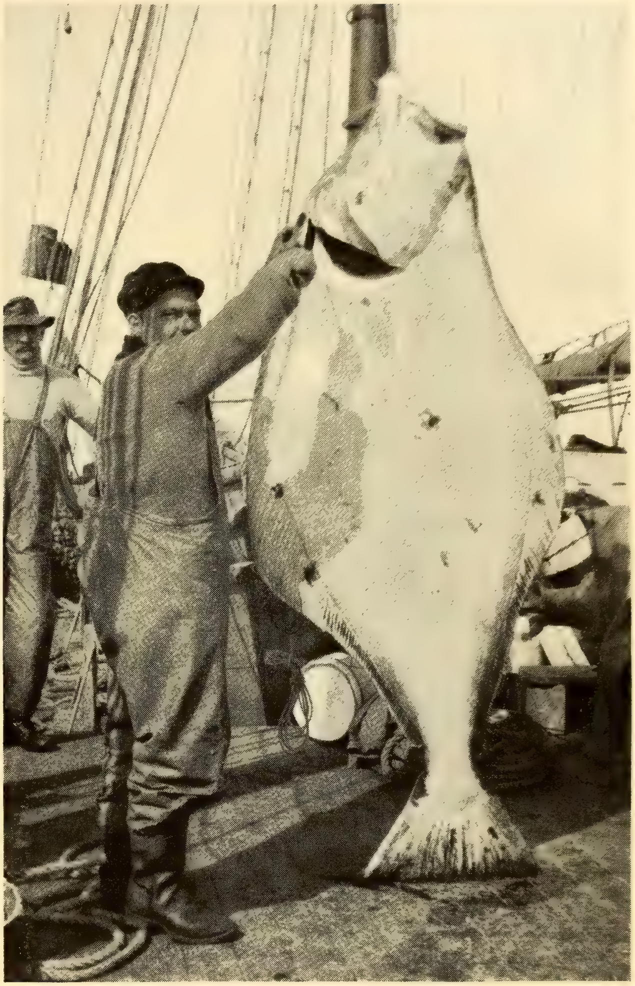
In summer, fog is the fisherman's

worst enemy. Dories may be strung out when it is fine and clear, and before they can be picked up again they are blanketed from view in a wet, sight-defying mist.

The skippers are wonderfully clever at locating the hidden dories, but it often happens that some cannot be found, and their names are listed with the yearly death toll of the Banks.

But there are not many casualties, considering the frequency of the fogs, and I can remember one occasion when 56 dories were reported astray from their vessels and all were either picked up by other schooners or else rowed in from the Banks to the land. Some of the distances stray fishermen have rowed in dories seem incredible, but a pull of 150 to 175 miles in rough weather and without food is not an unusual accomplishment.

A few years ago, during April, two fishermen got astray from their vessel on Quero Bank and were picked up *fourteen days* afterward 30 miles northwest of St. Pierre. They had but a little cake and some water to sustain them during that period and only managed to keep from freezing to death by constant rowing. One man's feet and hands were black from frostbite when picked up.



A BIG FELLOW: A GULF OF ST. LAWRENCE HALIBUT WEIGHING ABOUT 300 POUNDS

THE SIREN STRIKES TERROR

Fog inspires fear in fishermen by reason of the danger of being run down by steamers. Many schooners have been sent to the bottom thus, and the roar of a steamer's siren close aboard in foggy weather will have a crowd of fishermen out of their bunks quicker than anything else I know of.

It is a most disturbing sensation to be lying becalmed and helpless in a clammy mist and to hear a steamer blowing in the vicinity. One never can tell from which direction she is coming, and the fishermen blow horns, light torches, fire guns, and ring bells when the dreaded blast is heard.

During the winter months the Banksmen fishing for market endure some strenuous times. Chilling cold, strong winds, rough seas, and ice and snow make of dory-fishing at this season a somewhat risky and desperately arduous occupation.

THE FINEST BOATMEN IN THE WORLD

The schooner is stripped for heavy weather, topmasts and light sails are left ashore, and fishing is carried on during the lulls in the squalls. Time is valuable

HOMEWARD BOUND: A BANKER IN WINTER RIG

on market Bankers and only a steady gale will keep the fishermen aboard the schooner.

If the weather is intermittently squally, the dories go overside and make "one-tub sets," coming aboard the schooner when it is snowing and blowing too hard and setting out again when the flurry eases off.

It is in weather like this that one is compelled to give the Bank fishermen their due. To see them swing their dories overside on a black winter's morning and pull out over a tumbling sea and set their lines with a torch aflare on the dory gunwale is a most impressive sight. One can see them on a windy day toiling and tossing in their frail craft on a cresting waste of gray waters and blotted from sight every now and again by squalls of snow.

To set and haul their gear, to pull a heavy dory with a load of cod and haddock in a broil of wind-whipped combers, demands a skill and hardihood which makes the American Bank fisherman the finest boatman in the world.

The low temperatures which often prevail in our western waters in winter add to the fisherman's trials. Dories often become so heavily encased in ice that they are in danger of foundering with the weight of it. Schooners also run the same danger, and it is not an uncommon occurrence for a vessel to be so heavily iced-up that she dare not venture any longer toward the coast, but is compelled to run offshore, to the warmer temperatures in the Gulf Stream.

BRAVING THE GALE WITH LASHED WHEEL AND BARE MASTS

When on the Banks, fishing vessels do not run for harbor every time the barometer foretells a gale. The usual thing is to take it hove-to under foresail and jumbo, and this sail can be reduced down to a reefed foresail if necessary. In one tremendous winter gale, we had to haul everything off the schooner, and she lay for four hours under bare poles, with wheel lashed and all hands below.

The modern Bank fishing-schooner will make "good weather" of a hard gale and a mountainous sea and seldom take aboard any water to hurt; but life on a fishing-schooner hove-to in such weather is by no means pleasant. Its fearful leaps and plunges make it almost impossible to walk one step without hanging on to something, and the muscles of the body become strained and sore with the jolting and swinging. To eat and sleep under such conditions as the fishermen do calls for unusual stamina.

The living quarters in fishing-schooners are in forecastle and cabin. These apartments are lined with bunks—possibly sixteen single bunks forward and four to six double bunks aft.

The galley is located in the after part of the forecastle and the mess-table is fitted between the foremast and the windlass-pawl-post. All hands eat their meals in the forecastle.

The skipper lives aft, in the cabin. In some schooners he has a little room to himself, but in a good many he sleeps in an open bunk like the fishermen. The galley stove keeps the forecastle warm, and a small "bogey," or base-burner, heats the cabin.

As fishermen are constantly wet, the stoves are kept continually fired to dry out sodden clothing.

THE FISHERMAN FEASTS LIKE AN EPICURE

Though it is a hard, cold, and hazardous existence, yet the fisherman's life has some compensations. The cooks carried are masters of the culinary art and the meals provided are of the most luxurious description. All the staples and all the luxuries go aboard a fishing vessel, and the scale of victualing is Biltmore style without the silver and cut-glass.

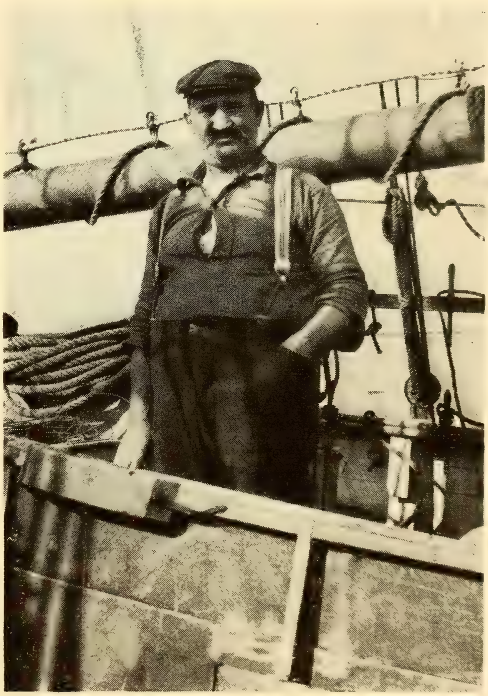
A fisherman is always hungry, and in addition to three square meals per diem, he indulges in a "mug-up" between times from the "shack locker," or quick-lunch cupboard in the forecastle. Tea and coffee are always on the stove.

With stoves going below, it is always warm and pleasant in cabin and forecastle, and a fisherman's bunk, with a good thick quilt or blanket and a straw mattress, makes a snug sleeping place. One never sheds many clothes on retiring; the discarding of boots and jacket is enough.

The cabins and forecastles are clean and well kept. Vermin is a fisherman's horror, and the writer has known men of questionable cleanliness to be sent ashore.

There is a certain spirit of independence to the fisherman's life which makes it attractive. He is under no master but

A TYPICAL FISHING VESSEL SKIPPER



THE BANKER'S COOK

This deep-sea chef will feed a hungry crowd of twenty-five men with a plentiful variety of well-cooked food, three times a day, in fair weather or foul.

A MOONLIGHT EFFECT ON THE GRAND BANKS

the skipper, whose rule is a fairly tolerant one. The men obey his orders without question. It is he who finds the fishing grounds, and the harder he keeps them working, the more money they will draw when the catch is sold.

A hard-driving, hard-working skipper can always pick up a crew, while the easy-going vessel master is not likely to be a big "fish-killer" and will never secure the best men.

THE RACE TO MARKET

Then there is the sailing. A smart vessel is a fisherman's pride, and he will never lose an opportunity to try her out against other craft. Your fisherman is a sail-dragger. He believes in carrying his canvas to the last minute, just for the fun of seeing her go. To be one of a fleet of Banksmen "swinging off" for market in a stiff breeze is to confirm one in the belief that the American fisherman is the finest sailor of the present day.

Sail is crowded on the schooner until her decks are like the side of a house and the scuppers are abroil with water. Fourteen to sixteen knots an hour have often been made, and some skippers take a pride in their ability to carry canvas and refuse to reduce sail until the lee-rail is under water.

The fisherman is a pretty good helmsman and can, as a rule, steer these quick and jaunty schooners "through the eye of a needle." Their nerve in steering a vessel running before the wind and sea with the big main-boom "broad off" is often commented upon, as in heavy weather this is the most dangerous point of sailing in a fore-and-after.

THE SKIPPER IS A MAN OF MARK IN HIS PROFESSION

The American Bank fishing skipper is in a class by himself. He is usually a fisherman with ambition, who comes out of the dory and makes a bid for the command of a vessel. It is a profession that is not overcrowded, and the successful fishing skipper is a man of mark by process of survival.

Many a man takes charge of a fishing craft and fails to make good. There is no come-back for him. Even if an owner entrusted him with a vessel again, it is doubtful whether he would get a crew. Fishermen do not sail with doubtful skippers or known failures.

The ability to sail and navigate a vessel is secondary to the ability to find and secure fish. Some skippers are lucky, but real hard work spells the story of success.

The "high-line" skippers have always been "hustlers." They hustle the vessel out to the Banks, hustle the dories over the side, and keep the crowd hustling as long as the weather allows. If it comes on to blow, they hang to the Bank until it eases off and swing the dories over while the seas are smoothing down.

Even though not particularly lucky in striking big "jags" of fish, yet the hustling policy of these skippers tells in the long run. They lose no opportunity to get the lines in the water and always plan to bring aboard some fish every day. After a week or ten days of this work, they invariably hustle off to port with a paying catch.

MEN MUST HAVE CONFIDENCE IN THEIR SKIPPER

The successful Bank skipper must be a smart vessel-handler, to inspire confidence in his gang. They prefer to go out in the dories secure in the knowledge that the skipper can pick them up again if it comes on to blow. The skipper who gets adrift from his crowd in squall or fog will find it hard getting a crew to ship with him again.

He must be an optimist and a diplomat, to handle the independent crowd who sail with him. He must never show nervousness or fear in dangerous situations and he must be ever ready to do the right thing at the right moment.

The men pin their faith on the skipper and trust him implicitly. Should he show anxiety as to his whereabouts in dangerous waters in thick weather, or become confused when the wrong turn of the wheel may lead to a collision, his crew become panicky and will lose their faith in his ability.

He must also be something of a business man and keep the expenses of the trip down as much as possible. There is no profit in catching just enough to pay the outfitting. He is expected to know where bait can be procured at certain seasons and to run in and purchase it at the lowest price and without the loss of too much time, and his good judgment is called for a hundred times during a voyage.

To be at once a navigator, a sailor, a fisherman, a diplomat, and a business man makes of the American Bank fishing skipper an outstanding type, and the most of them are splendid fellows. They earn good money, but deserve every penny of it.

THE SALT FISHERMAN'S LIFE IS EASIER

While we have taken the market Banker as a study in the foregoing, the salt Bank fisherman and halibuter present but little differences. The fishing is carried on from dories in a somewhat similar manner, but the salt fishermen, as a rule, take life easier. The season for salt fishing extends from March to October, and the schooners make from two to four trips during that period. The method of fishing by "flying sets"—towing the dories and dropping them over the Bank—is carried on to some extent by salt fishermen, but these craft usually anchor on the Bank, and the dories row away from the vessel, take up their position, and set the gear.

If fishing is good, the lines are left in the water and "under-run"—*i. e.,* the fish are taken off and the hooks immediately baited again without hauling the whole line up and taking it aboard the schooner to do so. When the fish begin to thin out, the gear is taken up and the schooner makes sail for another fishing ground.

Halibut fishing is possibly the most exciting of all. Cod, haddock, and similar species are quiet fish, with but little life in them when hauled up from the bottom. But the halibut is a fighter and has to be clubbed by the dory-men before being taken into the dory.

In the summer months, when the fish are inshore in shoal water, the halibut is a troublesome fellow to land. I remember while halibut fishing around Anticosti, in the Gulf of St. Lawrence, the terrible struggles we had with fighting halibut in forty and fifty feet of water. The writhing and squirming of a hundred-pounder would give a fisherman all he could manage in getting him aboard the dory, and very often he would have to cut the snood and let the fish go, lest by his struggling he capsize the boat.

Even when the fish has been clubbed into quietness and hauled into the dory, he will wake up and thrash the oars, thwarts, and gear overboard by the smacks of his tail. Old-time halibuters provide for this contingency by lashing the halibut's tail to the rising-strips of the boat.

In deep water, say 100 fathoms, the halibut are not so wild. The long pull from the bottom to the surface has exhausted the fish and they are more easily handled.

An instance of the daring of fishermen was seen by the writer on a halibut trip when, during a savage squall, a heavily loaded dory was half swamped by a comber. The two dory-mates tied lines to some of the fish and hung them overboard to lighten the boat, while one man bailed and the other kept the dory bows-on to the sea. Unable to row down to the schooner with the fish overside, they remained thus for two or three hours, until the vessel worked to windward of them and picked them up.

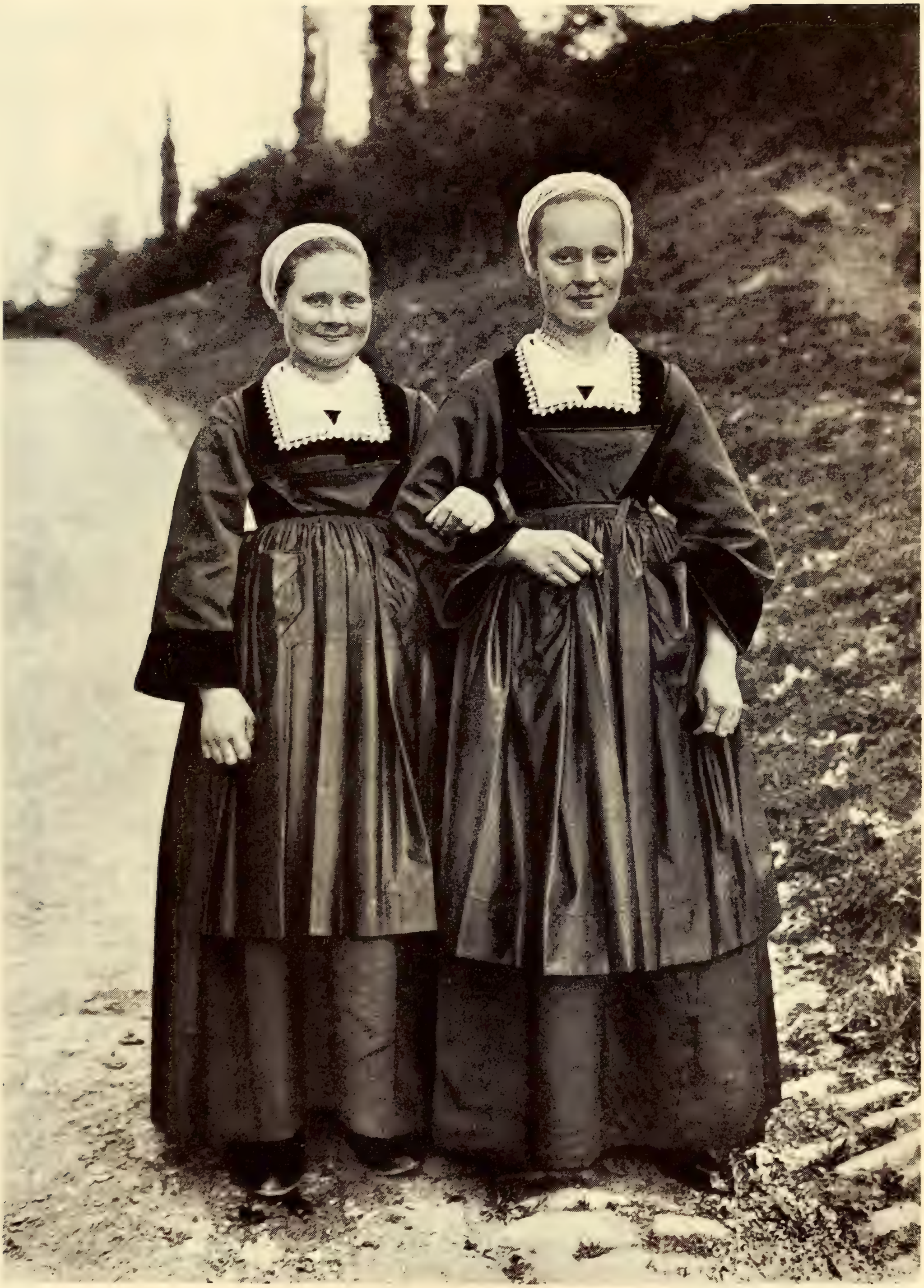
HAND-CAUGHT FISH ARE SUPERIOR

In addition to long-lining from dories, a few vessels fish by means of hand-lines from dories. Hand-line dories are a trifle smaller than the others and one man usually fishes from them.

The hand-line is equipped with two or three hooks and a lead sinker, and the fisherman will operate several lines at a time. Cod and haddock caught by hand-line are conceded to be superior to long-line-caught fish, and this method is employed in both fresh and salt Bank fishing.

The age of the clipper ship and the seamen who sailed them is gone, but in the American Banksmen we find the smartest sailing craft and the smartest sailormen afloat today. But the steam and motor trawler is coming into the American fisheries and many of the tall-sparred schooners are having their sails and masts cut down and internal-combustion engines installed.

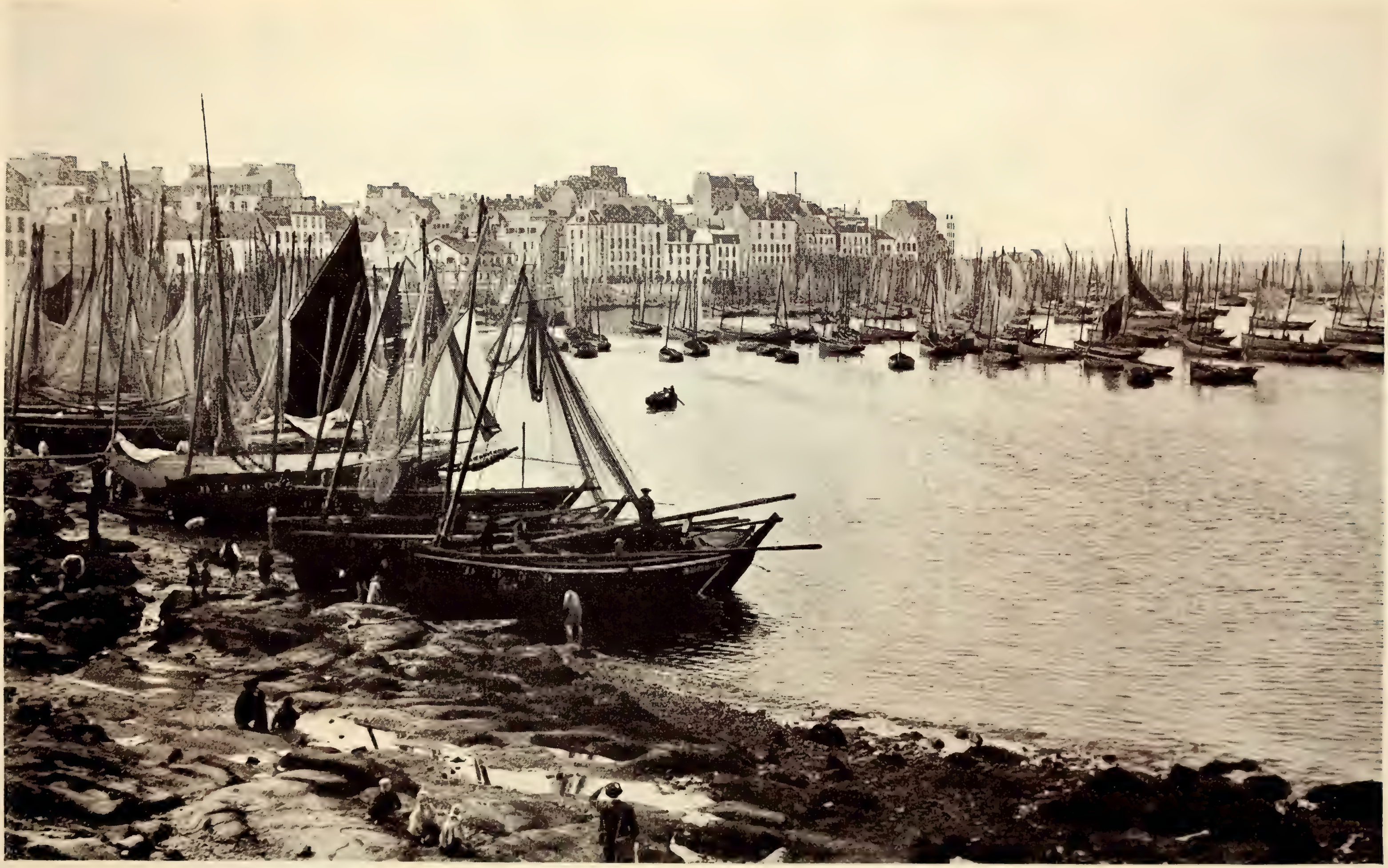
In a few years from now the schooner fleet will give way to power and the sailor-fishermen who drove these smart and able hookers over the seas will have evolved into sea-mechanics.



Photograph by Creté, Ltd.

TWO BRETON M'SELLES

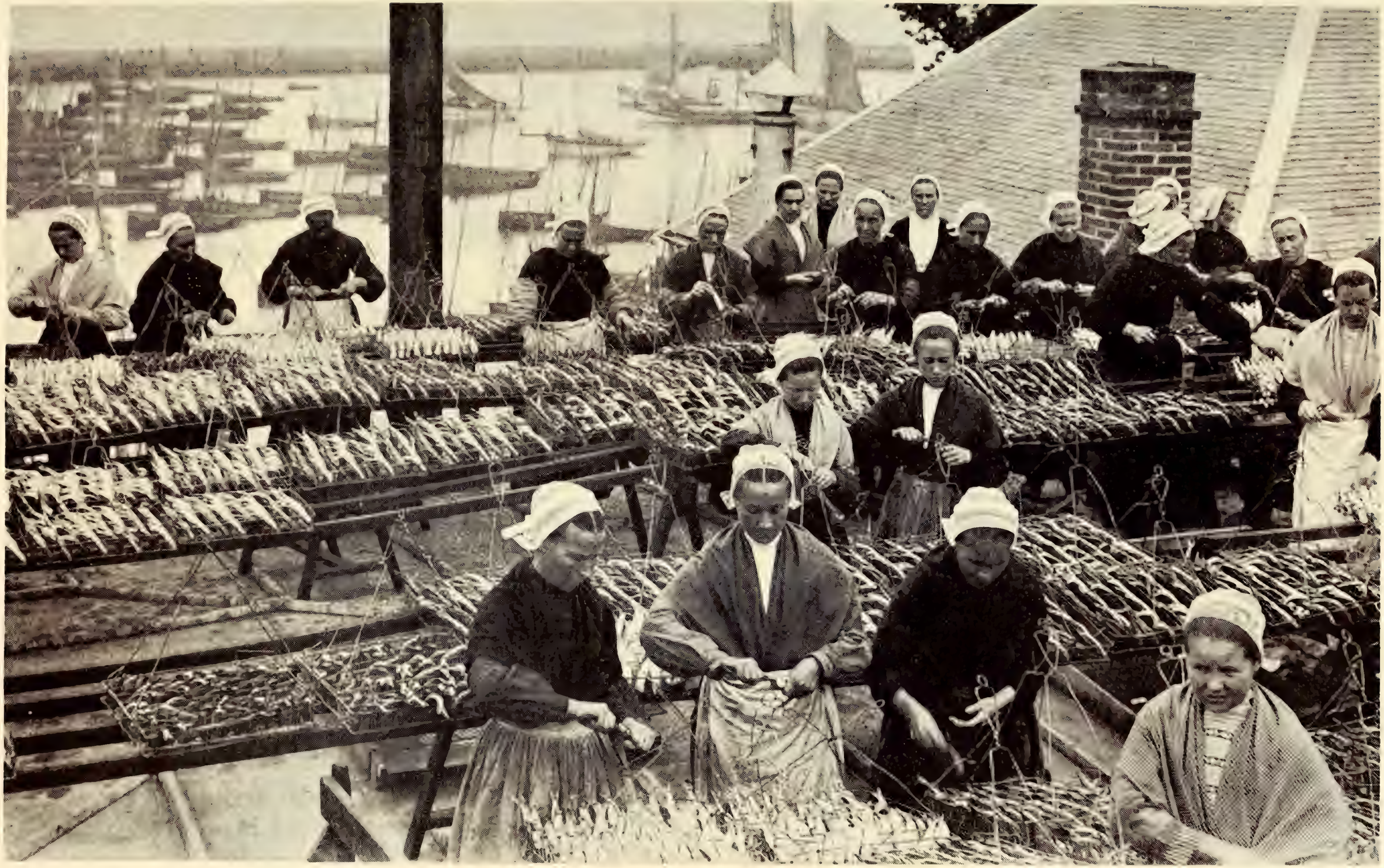
The peasants of Brittany wear costumes of the same design from generation to generation. Women and girls wear snow-white linen collars and lace-bordered caps in a wide variety of shapes. Each peculiarity of design has its meaning, and indicates the home district of the wearer. These two young women live at Huelgoat, a village in Finistère, the westernmost department of France, whose largest city is Brest.



Photograph by Creté, Ltd.

WHERE THE HUMBLE SARDINE REIGNS SUPREME

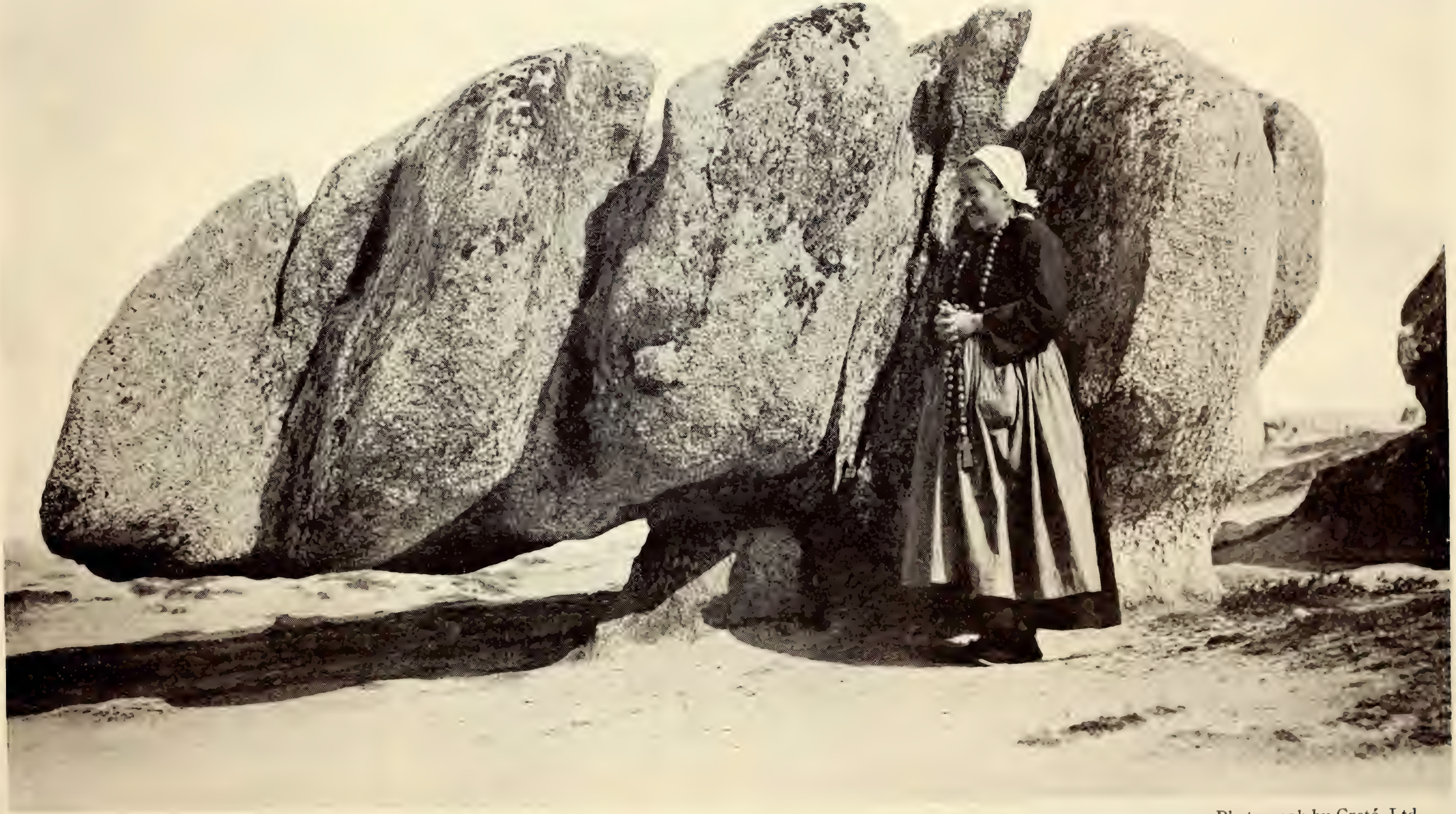
Douarnenez, situated on the fine bay of the same name, on the northern Atlantic coast of France, is an important center of the sardine industry. Hundreds of sturdy little fishing boats put out from here, and return laden with myriads of miniature fishes, to be packed into tins and shipped to all the world.



Photograph by Creté, Ltd.

DRYING SARDINES IN BRITTANY

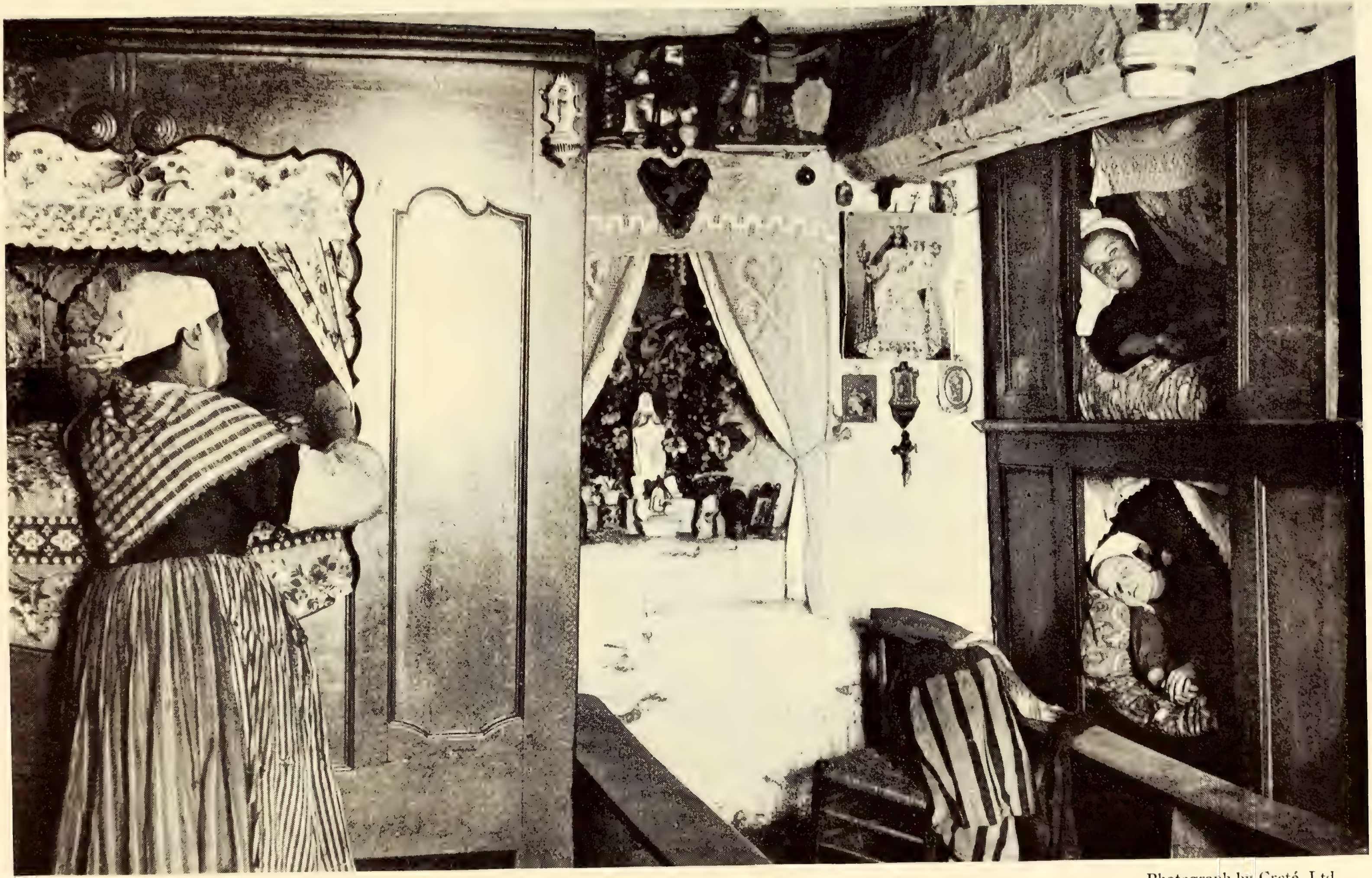
Men, women, and children depend upon the sardine for a livelihood in Brittany, and a hard winter, which interferes with the fishing, brings distress to all the people. Breton fishermen are numerous in the French navy, and it has been estimated that nearly three-quarters of its best seamen received their early training on stormy seas in the sardine fleet.



Photograph by Creté, Ltd.

BRITTANY IS A LAND OF LEGEND

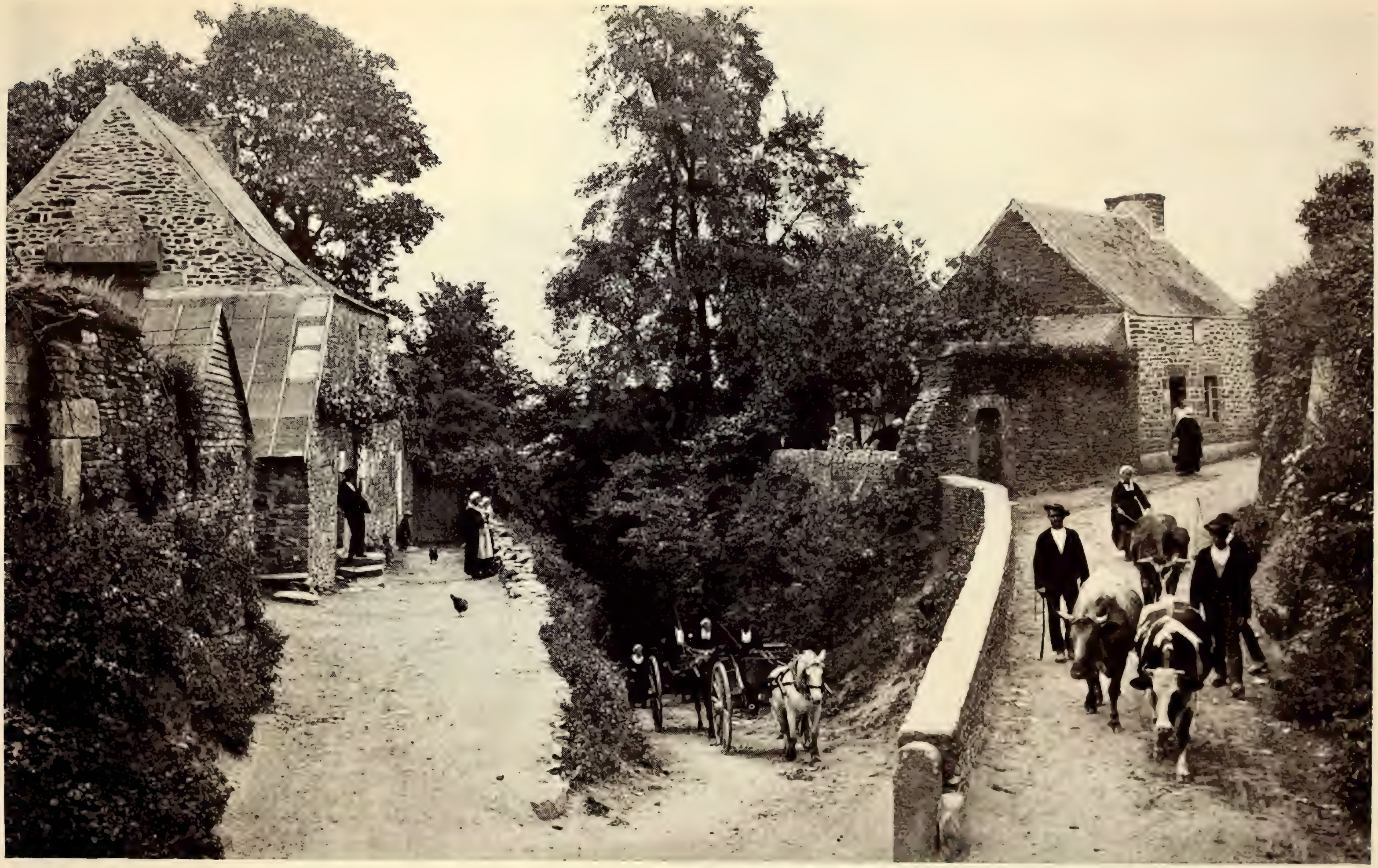
Relics of the Druids in the form of these great megaliths are scattered over the Breton moors, and many are the weird stories which the peasants tell about them. The hieroglyphs of Egypt and the cuneiform script of ancient Babylonia and Assyria are simple when compared to the mystery of these monuments of a forgotten race. The Breton wife who wishes to become a mother believes that her hopes will be realized if she stands beside the stone shown in this illustration.



Photograph by Creté, Ltd.

INSIDE A BRETON HOME

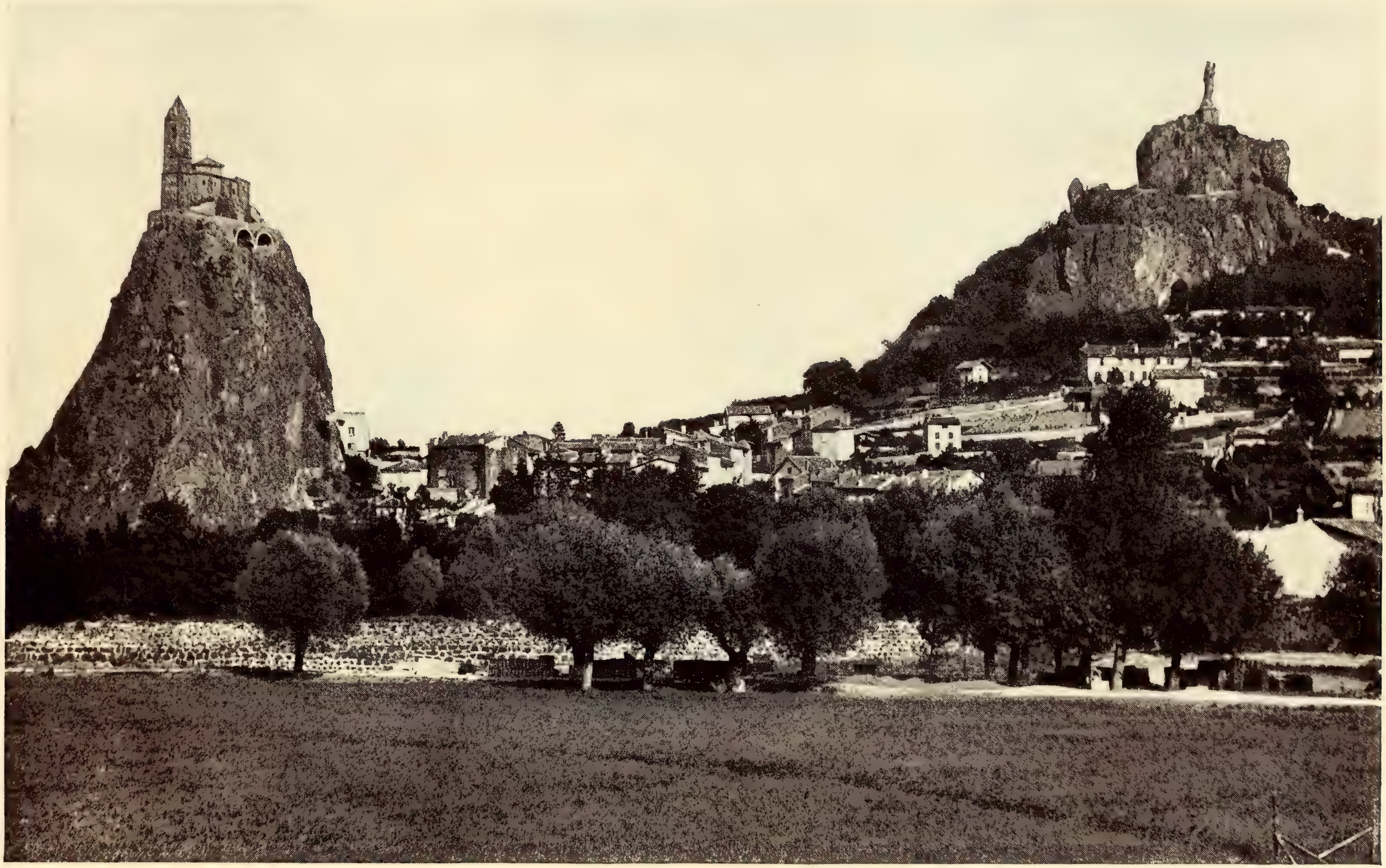
The one-room Breton farmhouses have floors of hard-trodden earth; the ceilings are ribbed with rough-hewn rafters, from which hang knives, forks, pans, pots, dishes, and other household articles. The beds, or bunks, one above another, occupy niches in the thick walls and have sliding panels, to be closed when the beds are not in use. Beneath the bottom bunk is usually a compartment where the family linen is stored. Sunlight and fresh air are strangers to such interiors.



Photograph by Creté, Ltd.

UPS AND DOWNS IN BRITTANY

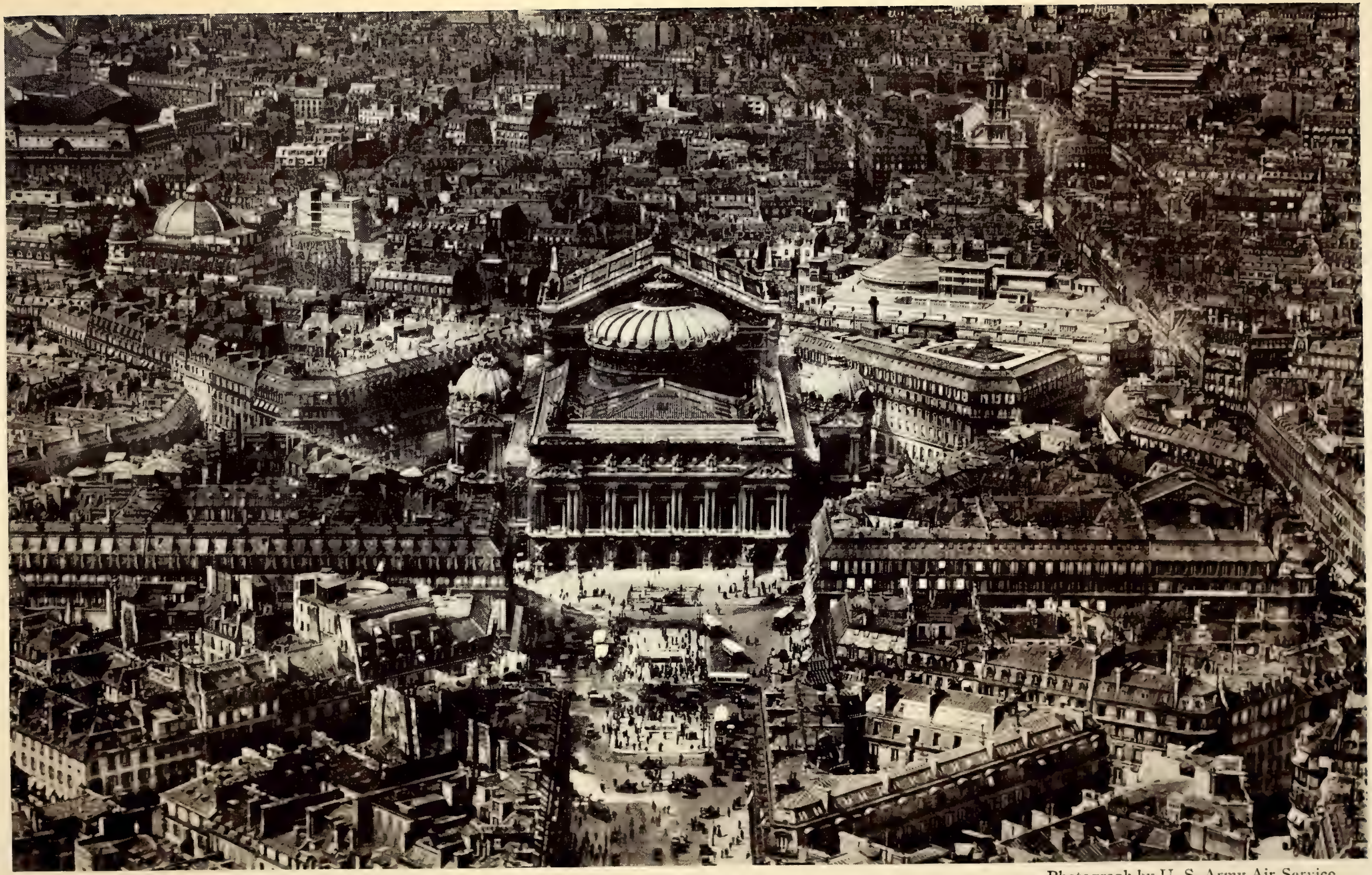
In ancient days this little town of Carhaix, which is now known chiefly for its excellent breed of cattle, was a place of importance and capital of the Osismii, one of the tribes of Gaul which took an active part in the wars against Cæsar. The remains of a Roman aqueduct are still to to be seen here.



Photograph by Creté, Ltd.

IDENTIFYING FEATURES OF THE CITY OF LE PUY, IN SOUTHERN FRANCE

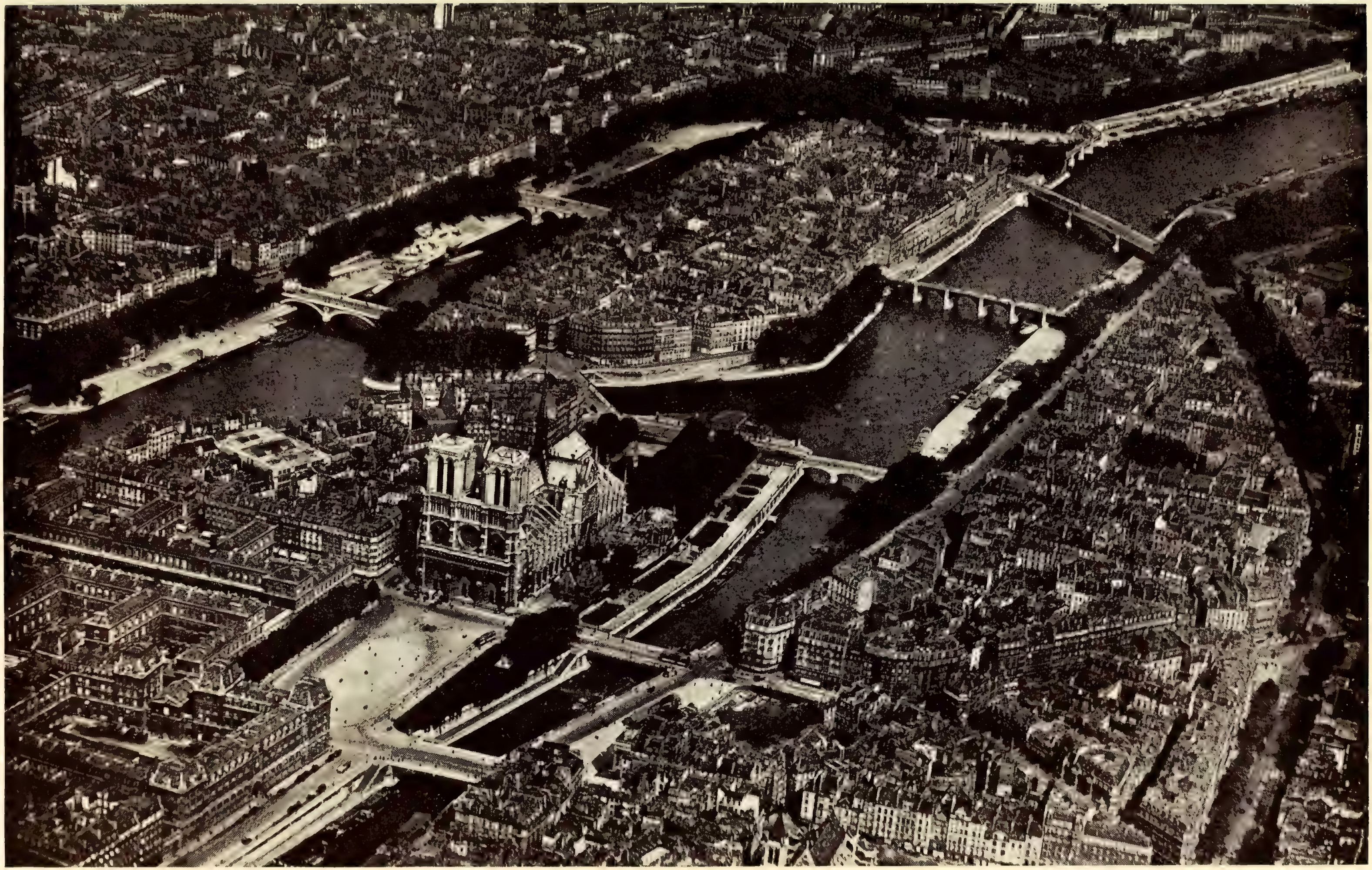
At the left, on the top of a basalt rock, stands the tenth-century Romanesque Chapel of St.-Michel d'Aiguilhe. At the right, on the top of a still higher rocky upthrust, is the colossal statue of Notre-Dame-de-France, molded from the metal of more than 200 Russian cannon taken at Sebastopol, in the Crimean War. The city proper, containing many fine medieval houses, lies to the right.



Photograph by U. S. Army Air Service

THE CENTER OF MODERN PARIS

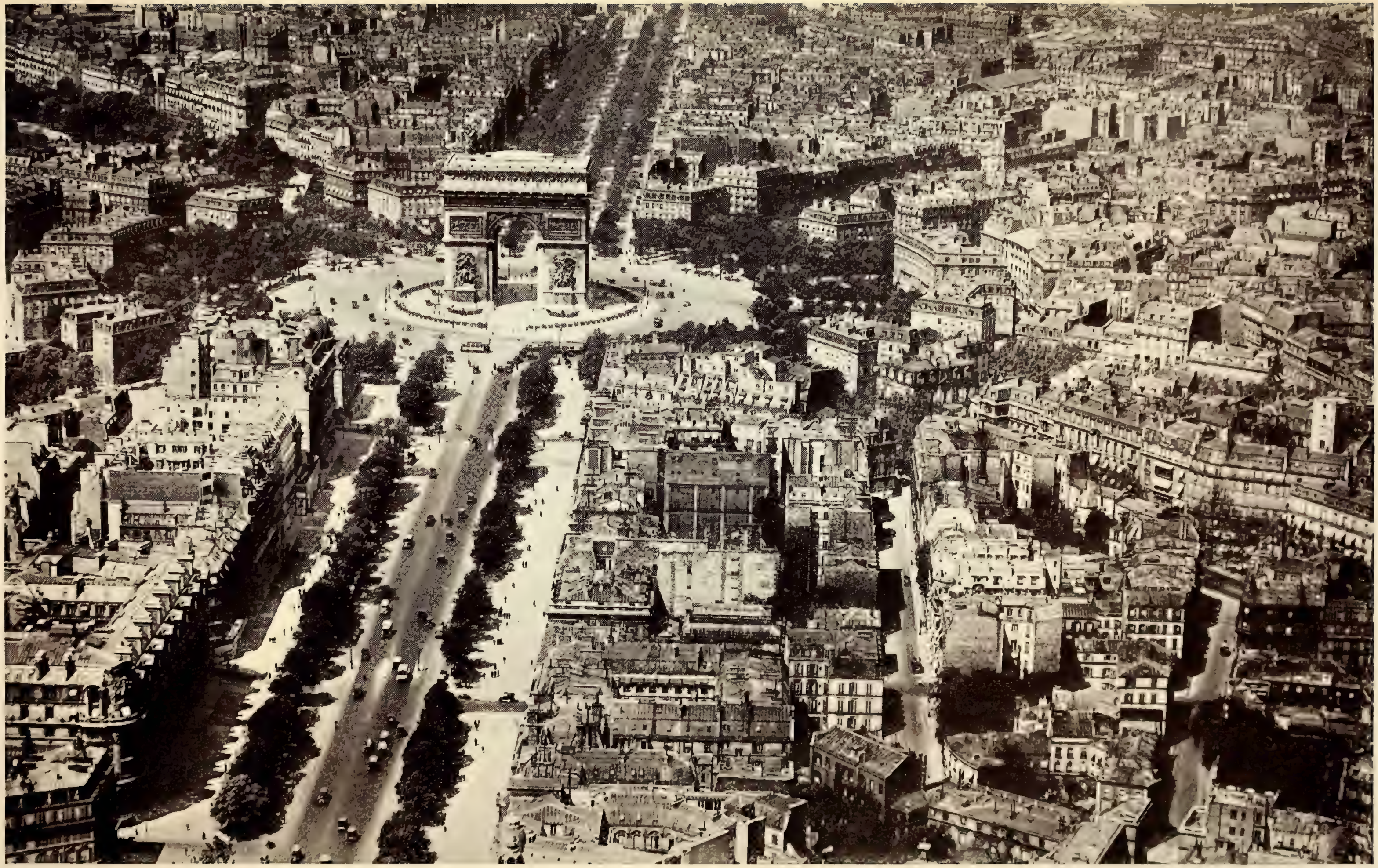
Looking down upon the Place de l'Opéra and the Opera itself, the airman beholds the very heart of "gay Paree." Entering the square from the lower left is the famous Rue de la Paix, which is the Mecca of the feminine heart of every land. Modistes, jewelers, and perfumers pay fabulous rents for the most modest quarters here and dispense their wares to an appreciative world. Flanking the square, but not on the Rue de la Paix itself, is the Café de la Paix, around whose sidewalk tables sit and gossip all the races of the earth.



Photograph by U. S. Army Air Service

THE ILE DE LA CITÉ AND THE CATHEDRAL OF NOTRE DAME: PARIS

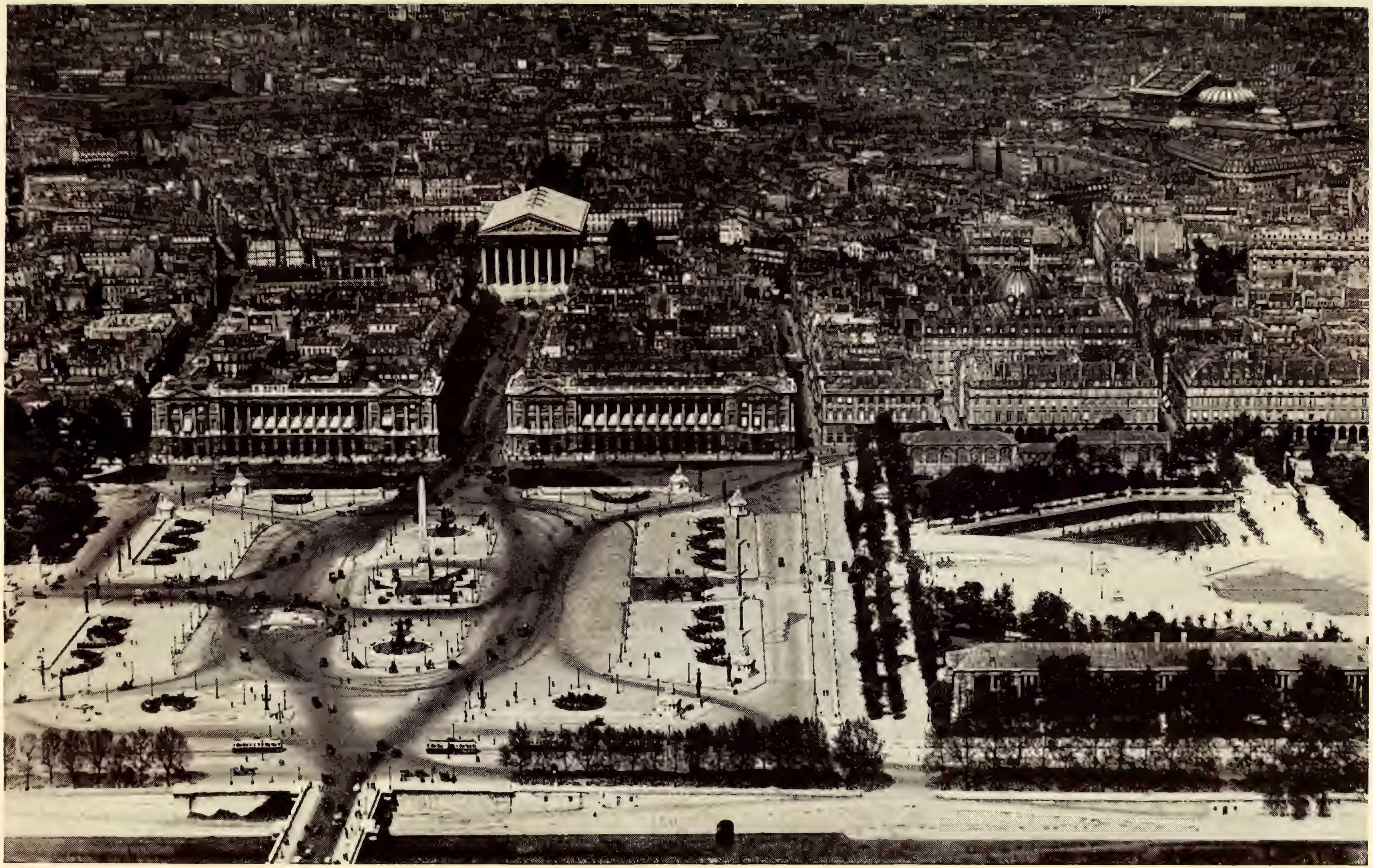
On this little island in the Seine was established the beginning of the French capital long before Cæsar's armies swept northward. Here was the Gallic town of Lutetia Parisiorum. For years this was the center of the city and the site of the royal palace. Now there are several public buildings here, but its principal object of interest is the Cathedral of Notre-Dame and the Sainte-Chapelle of the Palais de Justice, which was once the royal palace. Beyond is seen the Ile St. Louis, connected with the larger island by a bridge behind the cathedral.



Photograph by U. S. Army Air Service

THE CHAMPS ELYSÉES AND THE ARC DE TRIOMPHE: PARIS

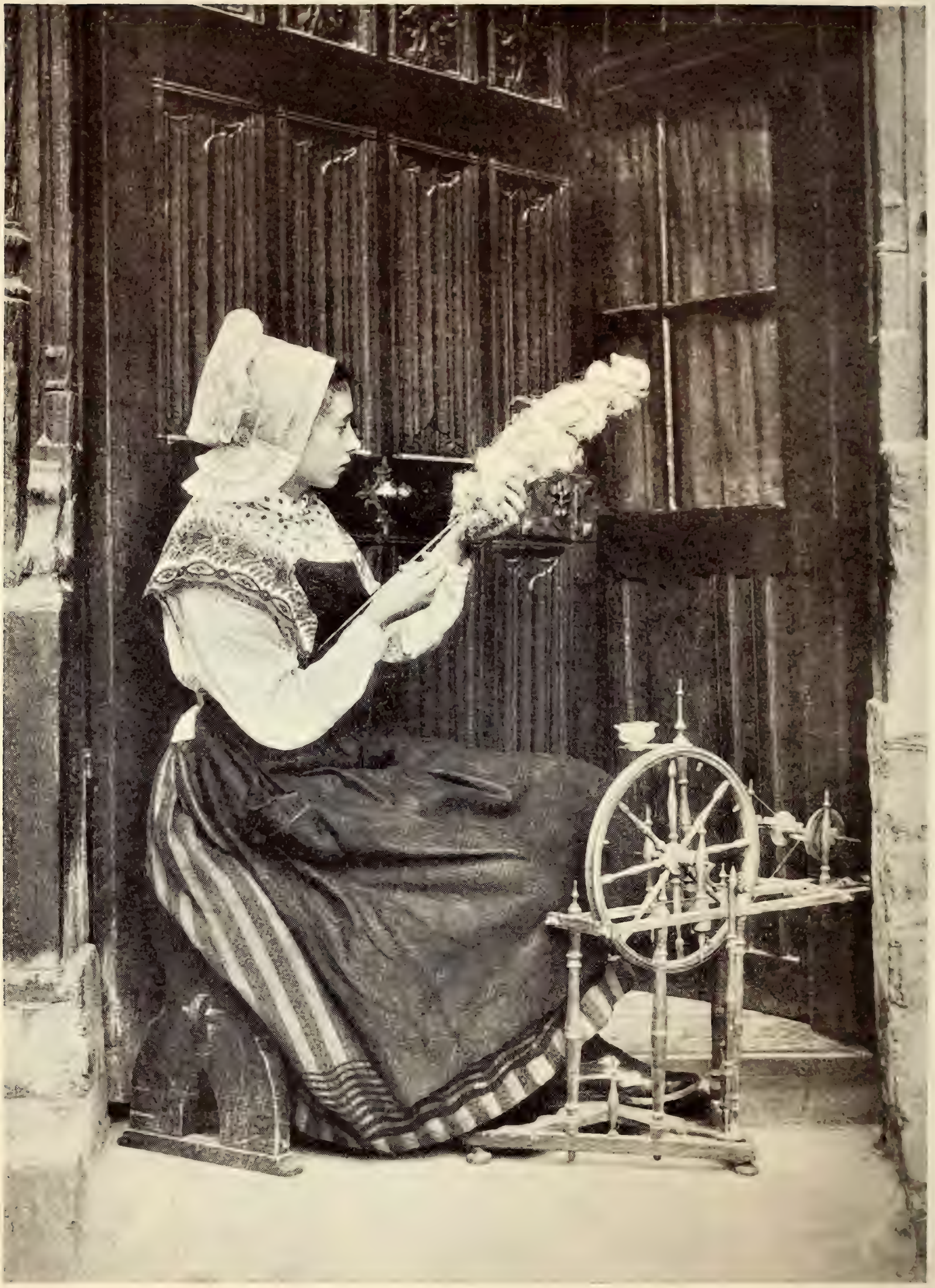
In the Place de l'Etoile, from which twelve wide avenues radiate, is Napoleon's triumphal arch, which he began in 1806 to commemorate his victories. The Champs Elysées is the matchless boulevard joining the Place de la Concorde and the Place de l'Etoile. Four sculptural groups decorate the pillars of the arch, and under the cornice are panels bearing the names of the principal Napoleonic victories. The Avenue de la Grande Armée, a continuation of the Champs Elysées beyond the arch, leads to the Bois de Boulogne and Neuilly, where stands the great hospital in which were located the wards maintained by members of the National Geographic Society during the World War.



Photograph by U. S. Army Air Service

THE PLACE DE LA CONCORDE AND THE MADELEINE: PARIS

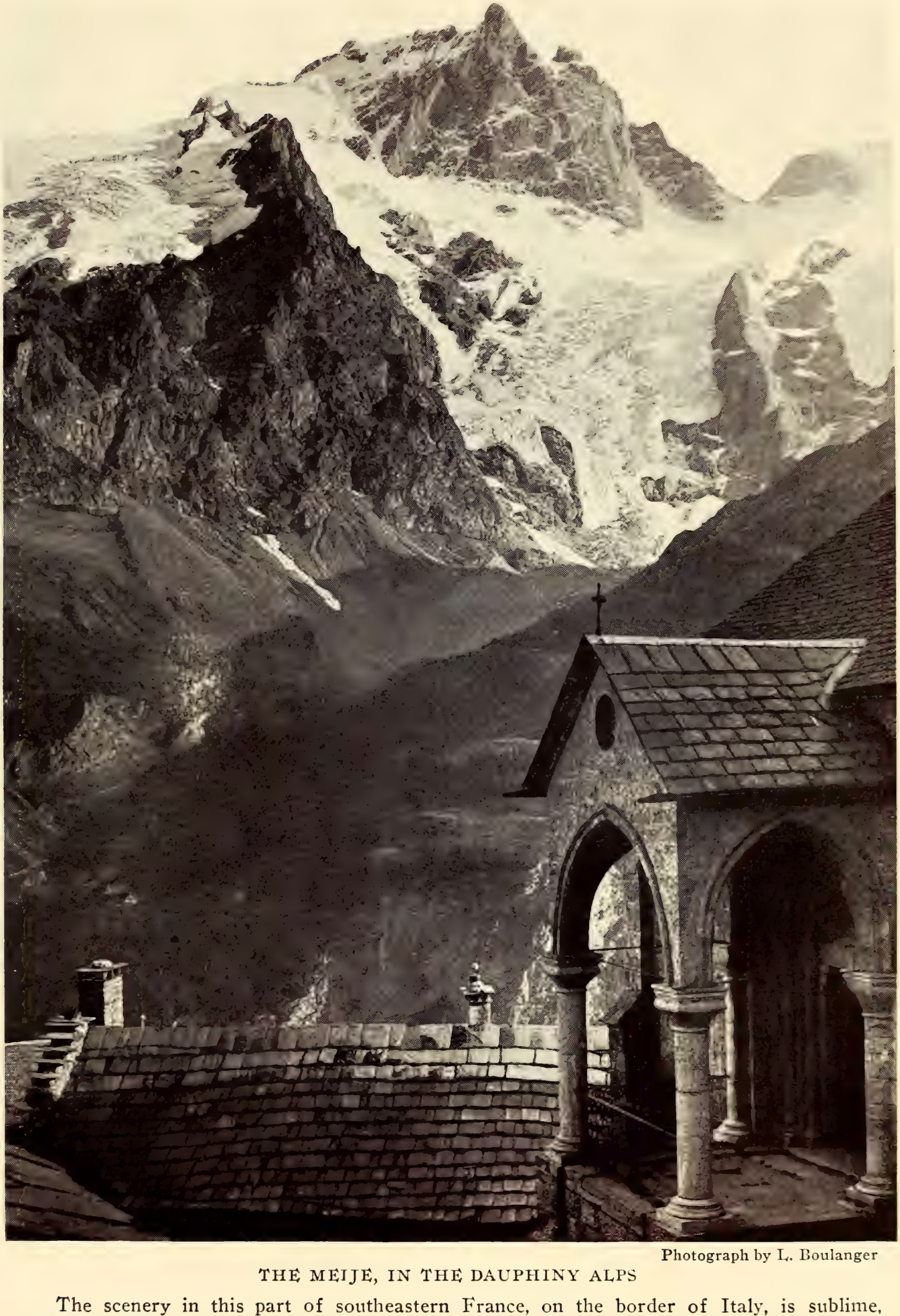
The obelisk which rises in the center of the Place de la Concorde resembles the "Cleopatra's Needle," which stands in Central Park, New York. Around the edges of this great square are statuary groups representing eight principal cities of France. The Strasbourg group wore mourning for nearly 50 years, but is now decked with wreaths to celebrate the restoration of Alsace. Facing the square to the left is the Hotel Crillon, where the American delegates to the Peace Conference were quartered. The famous Madeleine, or Church of St. Mary Magdalene, with its Corinthian colonnade, stands out clearly in the picture, while the dome of the Opera may be seen at the upper right. The famous restaurant, Maxim's, is on the left of the street leading from the Place de la Concorde to the Madeleine.



Photograph by Creté, Ltd.

A PEASANT GIRL OF NORMANDY

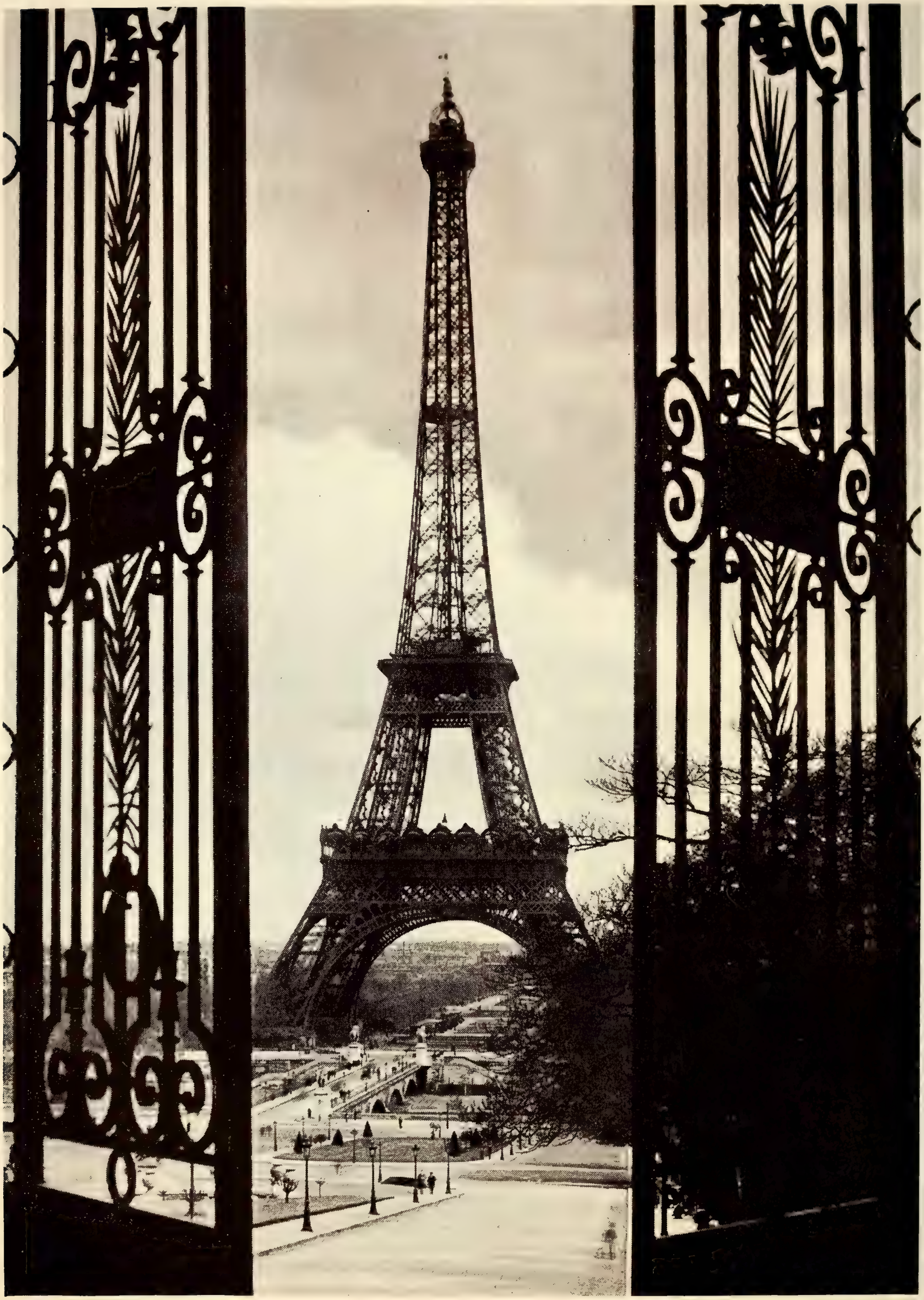
The Norman is a model of industry and thrift, even in France, where the common people are noted for making the utmost of their resources. While the Norman farmer is at work in his fields, his wife and daughters are making butter, tending the poultry, weaving lace, or spinning wool. In out-of-the-way places the beautiful old Norman dress may still be seen.



Photograph by L. Boulanger

THE MEIJE, IN THE DAUPHINY ALPS

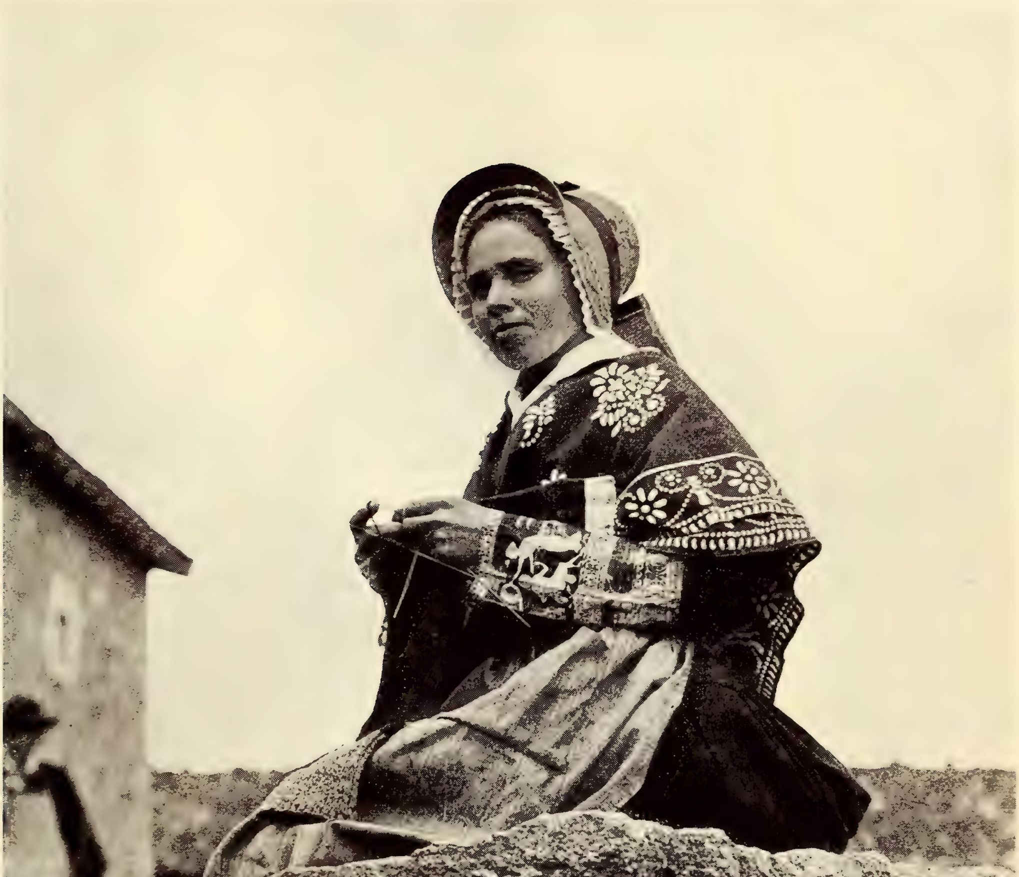
The scenery in this part of southeastern France, on the border of Italy, is sublime, though desolate, but is rendered accessible by modern engineering in the construction of good roads. This peak, by no means the highest, is one of the group of lofty summits lying entirely within French territory. Among mountaineers its ascent is noted for its difficulties, and to have climbed it is admission to exclusive mountain-climbing circles.



Photograph by Keystone View Company

MAN'S HIGHEST TOWER

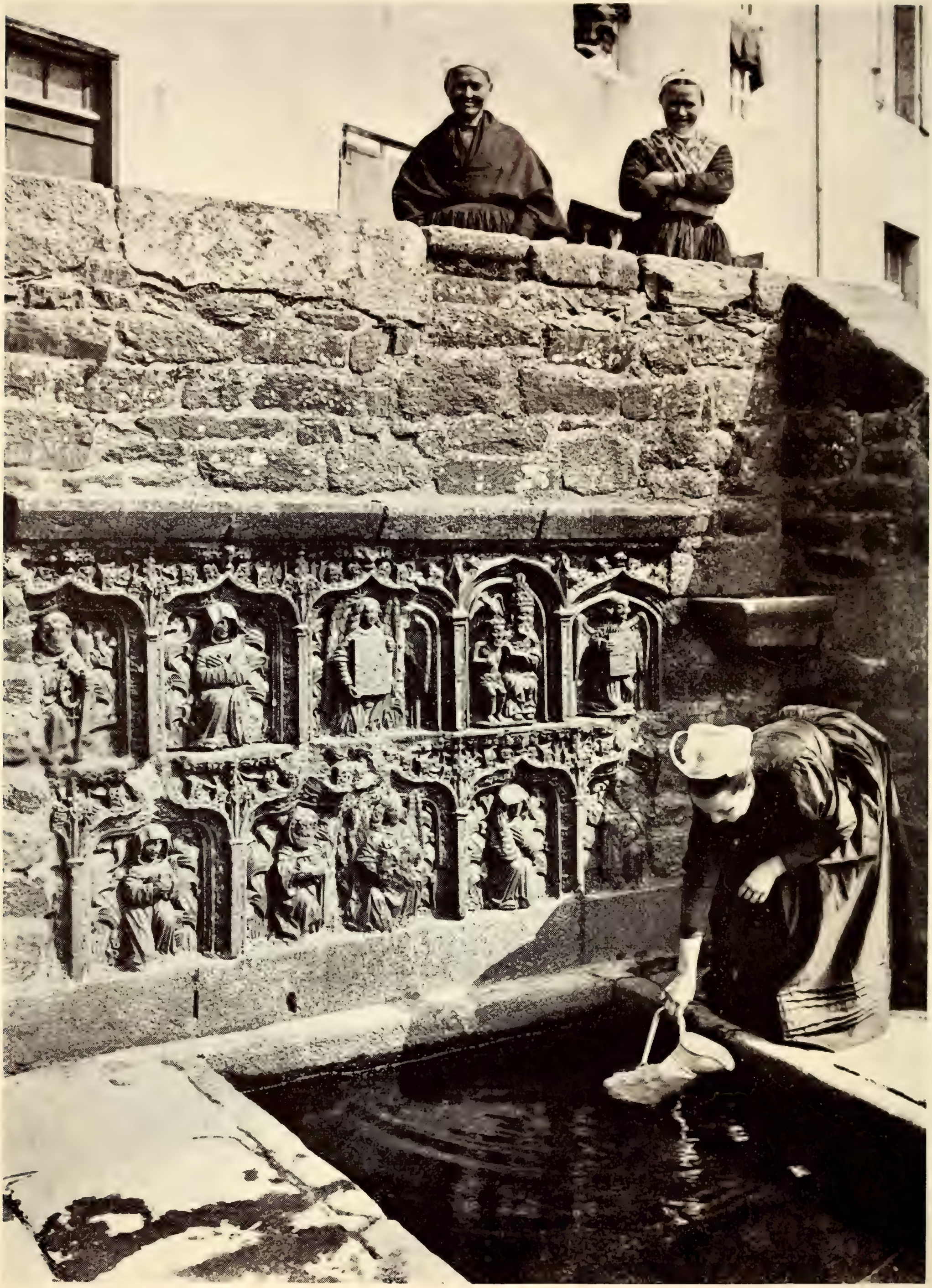
Like a great steel finger pointing toward heaven, the Eiffel Tower is to be seen from almost every point in Paris; but this view, through the doors of the Trocadéro, is most attractive. The height of this structure is just under a thousand feet, and of the several platforms the highest, where 800 people may gather, is 905 feet above the street. Above this there is a balcony, from which, on a clear day, one may see more than fifty miles. At the very top is a meteorological observatory and a wireless station.



Photograph by Creté, Ltd.

A WOMAN OF AUVERGNE

Below Paris, in the direction of the Pyrenees, lies the old French province of Auvergne, which is now divided into several departments, as the states of the French Republic are called. This is an old volcanic district, but no eruptions have occurred in historic times. The people resemble the Bretons of the north in their mode of living, but their costumes are quite different.



Photograph by Creté, Ltd.

ANOTHER REBEKAH AT THE WELL, THIS ONE A BRETON

This ancient and picturesque fountain in the little town of Landivisiau, Finistère, northern France, is named for St. Thivisiau, the patron of the locality. Unfortunately, the story of the carved stone panels which form its decoration has been lost in antiquity.

THE GEOGRAPHY OF JAPAN

With Special Reference to Its Influence on the Character of the Japanese People

By Walter Weston

Author of "Mountaineering and Exploration in the Japanese Alps" and "The Playground of the Far East"

THE islands of the Japanese Archipelago have been likened by the fertile fancy of its native geographers and poets to a garland of flowers or a girdle of jewels adorning the western margin of those far Eastern Seas. In prosaic fact, they really form the summit ridge of a stupendous mountain chain that rears itself from some of the profoundest ocean depths yet fathomed.

The main features of this gigantic mass quite clearly prove its geological kinship with the Asiatic mainland. The long, sinuous crest of these mountain islands of Japan forms the advanced frontier of eastern Asia.*

The bed of the ocean between Korea and Japan, near the Tsushima Straits, is so shallow that a comparatively slight upheaval of it would afford dry-land communication from one to the other. In the extreme north, at the island of Sakhalin, the distance from the Asiatic mainland can readily be crossed in a small canoe.

This fact has an important bearing on the flora of the Japanese Alpine regions, for its peculiar admixture of Alpine and northern plant forms points to its transmigration from Kamchatka and eastern Siberia, carried thence southward by the violent monsoons and currents, and then driven up the mountains by valley winds.

MANY POINTS OF SIMILARITY BETWEEN JAPAN AND THE BRITISH ISLES

There are many striking and suggestive points of resemblance between the islands of Japan and those of Britain. Just as Britain was close enough to the Continent of Europe readily to receive its civilization and religion, while maintaining the independence characteristic of an island race, so it has been with Japan.

It is from the Asiatic mainland that Japan has derived all its ancient arts, religion, and civilization—chiefly from China, either direct or by way of Korea.

It is freely admitted by the Japanese that practically the only item of the amenities of life for which they have not been in the past indebted to the Celestial Empire is their love of cleanliness. Almost every Japanese, whenever possible, has a hot bath at the end of his day's toil, whereas the Chinese rarely, in any sense, gets into hot water (if he can possibly get out of it), and he is popularly said to observe sarcastically, "What a dirty fellow a Japanese must be to need washing so often!"

Both in area and population Japan proper somewhat exceeds the British Isles, having 150,000 square miles as against 121,000, and 57,000,000 inhabitants compared with 45,000,000.

ONE MILE OF COAST FOR EVERY NINE SQUARE MILES

These islands are remarkable for the length of their coast-lines, which, compared with the area, give a ratio of one mile of coast to nine square miles of land. The ratio in the case of the British Isles is one mile of coast to thirteen square miles. With this deeply indented coast-line, there are many good natural harbors, though these are mostly confined to the Pacific coast.

The shores abound in rich supplies of fish of many kinds, which have for centuries constituted one of the chief articles of the daily food of the Japanese people, and the fishing industries have served to rear a hardy race of seafaring folk.

Yokohama, the chief seaport of the Empire, lies in practically the same latitude as Gibraltar, while the central portion of the great range of the "Japanese

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*For a map of Japan, see the National Geographic Society's "Map of Asia" (size, 28 x 36 inches), published as a supplement with the May Geographic.

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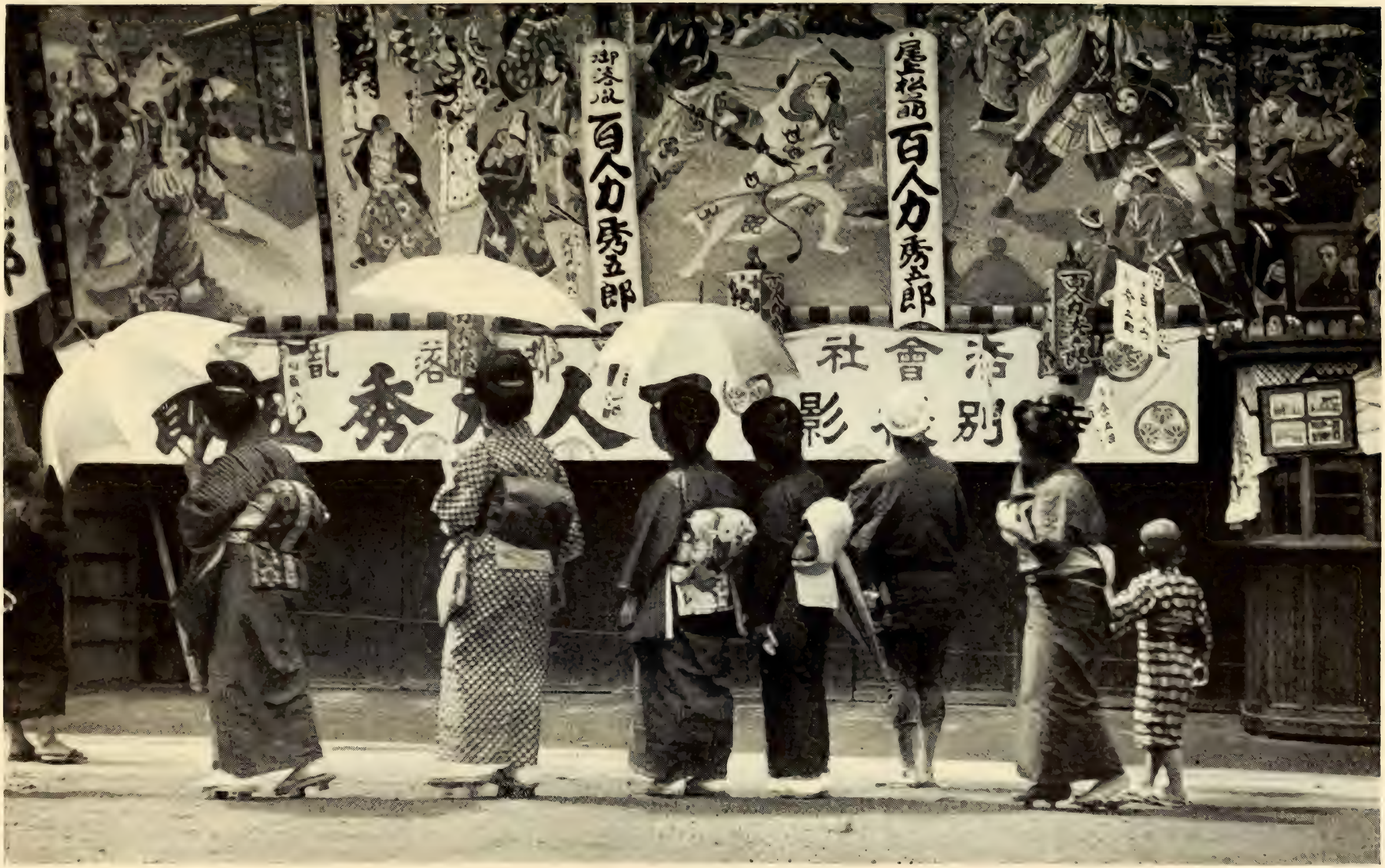
THE JAPANESE FARMER IS REALLY A GARDENER

In the land of Yoshihito, almost every plant is raised by hand, for there are five Japanese for every acre of land under cultivation. Only a small part of Japan is cultivable, the whole group of islands being very mountainous.


百人力秀五郎
百人力秀五郎

MAKING UP THEIR MINDS WHETHER OR NOT TO ATTEND THE "MOVIE" ADVERTISED BY THE POSTERS

The Japanese photoplay is melodramatic in its scope, and a would-be actor without a full equipment of swords and a white bandage with which to bind up his head would run little chance of posing for the camera.

Photograph from Walter Weston

A SNOW CREVASSE IN THE NORTH JAPANESE ALPS

Alps" corresponds in latitude and elevation with the Sierra Nevada of Spain.

AN AMAZING VARIETY OF SCENERY

The aspects of Nature in Japan, as in most volcanic countries, comprise an amazing variety of savage grandeur, appalling destructiveness, and almost heavenly beauty. From the mountains burst forth volcanic eruptions; from the land come tremblings; from the ocean sweeps in the dreaded tidal wave; over it rages the typhoon. Floods of rain in summer and autumn give rise to landslides and inundations. Along the coast the winds and currents are very variable. Sunken and emerging rocks line the shore.

All these make the dark side of Nature to cloud the imagination of man, and to arouse a nightmare of superstition in many untutored minds. Yet Nature's glory outshines her temporary gloom. The pomp of a luxurious vegetation, the splendor of the landscape, the clearness of the air, and the variety of the climate serve both to soothe and to enliven the spirits of man.

The majority of the inhabitants rarely see ice over an inch thick or snow more than 24 hours old. The surrounding ocean and the variable winds temper the climate in summer; the Kuro Shiwo, the "Gulf Stream" of the Pacific, modifies the cold of winter.

JAPANESE CHARACTER MOLDED BY ENVIRONMENT

These, then, are among the main influences of Nature in modifying and forming the physique and character of the people who inhabit Japan.

Add to the varied and violent contrasts the fact that the majority of the people dwell in houses mainly built of wood and paper, and therefore subject to sudden and complete destruction by fire, and we shall not be surprised to find them lively, impressionable, and artistic; but also, from the constant and imperative need of repairing the ravages wrought by these agencies, stoical, persevering, and withal, somewhat fatalistic.

The geographical features of Japan have much in common with those of ancient Hellas. In both there is the same combination of mountain, valley, and plain, a deeply indented coast-line, with its bays, peninsulas, and islands off the coast. Few places inland are far removed from the mountains, and not any are really distant from the sea.

In each case the configuration of the country conduced to the formation of small communities, and to kindle the spirit of independence; for just as Greece was, in a political sense, not one country, but a multitude of independent states, often exceedingly small and always jealous of their individuality, so, until the immense changes wrought by the transformation during the last fifty or sixty years, of intercommunication between the inland provinces of feudal Japan and those on the coast, many of those provinces had their own types of people, with numerous distinguishing differences of appearance, dialect, customs, and characteristics.

Photograph from Walter Weston

HAVING A HOT BATH AT THE SHIRAHONE SPRINGS, AMONG THE JAPANESE ALPS

Japan is rich in the possession of more than a thousand hot springs, to which the peasantry resort in multitudes (see text, page 51).

JAPANESE PARALLELS IN ANCIENT GREECE

Satsuma, in the extreme south of Japan, in many ways resembled Sparta, with its Lacedæmonians, both in inaccessibility of geographical position and in the character of its inhabitants. Both were stern, dour, unliterary, and somewhat harsh to strangers.

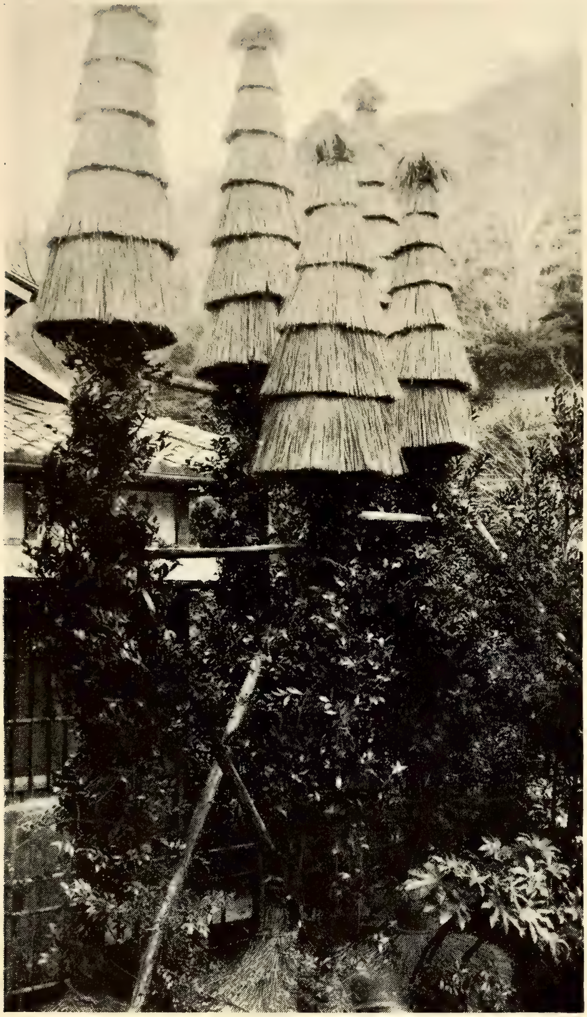
The dullness of the Bœotians finds its counterpart in that of some of the remoter peoples of the northern provinces of Japan; while Athens, intensely social, literary, and comparatively liberal in its intercourse with the outer world, has its own parallel in Kyoto, the old Japanese capital of the feudal days.

In the case of each country, the land was on all sides well protected, and yet also open to the sea; and in each case there was free access for commerce and civilization from early times, while the art of navigation was cultivated to an extent that bred a race of hardy and capable seafaring folk.

In each case the soil of the country, generally speaking, is only moderately fertile—a fact conducing to the industry and comparative frugality of the majority of its inhabitants.

It is as true of the Japanese today as of the Greeks of old, that a study of their natural surroundings affords a clue to their history.

When, as Mr. Freshfield writes in



Photograph by A. Nielen

JAPAN DRESSES HER TREES FOR WINTER

These jackets, or hoods of straw, are put over the tender tree-tops in autumn to protect them against frost.

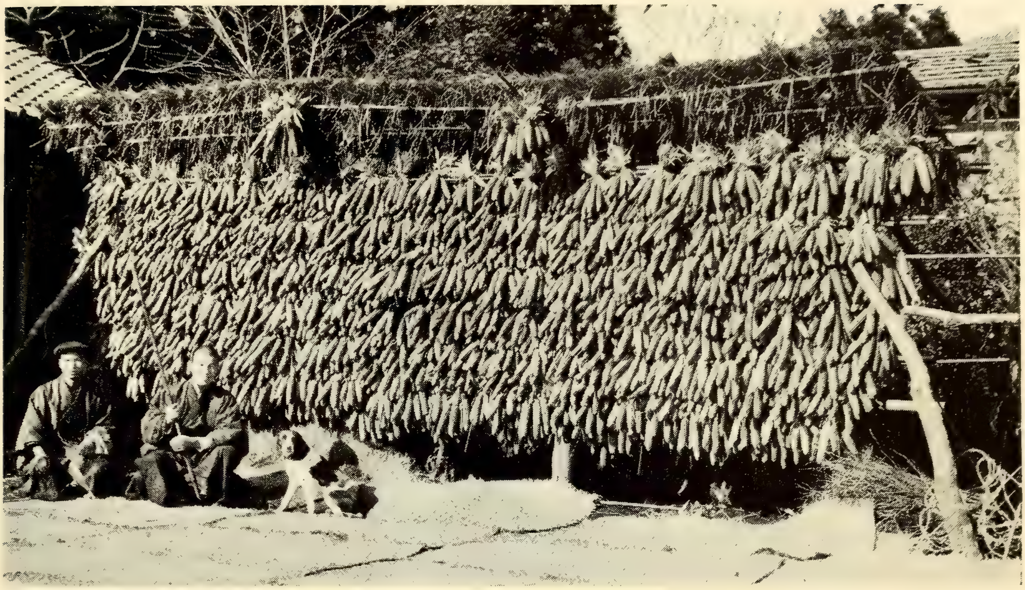
"Mountains and Mankind," we see how the Greeks "seized eagerly on any striking piece of hill scenery and connected it with a legend or a shrine"; how "they took their highest mountain — broad-backed Olympus—for the home of the gods"; and how "they found in the cliffs of Delphi a dwelling for their greatest oracle and a center for their patriotism"—when one remembers all this, one has but to substitute such names as that of the far loftier "peerless peak" of Fuji-san (Fuji-yama), or of Ontake, up to whose sacred summit-shrine the white-robed pilgrims toil by thousands, in sunshine and in storm, to worship; or of those still holier fanes in far-off Ise in Yamato, where only the Emperor himself or his chosen representative may enter, on behalf of his people, to hold converse with the spirits of the "Divine Ancestors," in order to see how close a resemblance exists between the influence of similar physical surroundings on two peoples endowed with the like characteristics of a lively, artistic, and impressionable nature.

Had Pausanias been able to pursue an itinerary in the Land of the Rising Sun similar to that which he followed in his "Description of Greece," he would have furnished us with pictures of scenery and observation of the folk-lore and legends of Japan that would, in a hundred separate instances, have been equally true of either of these beautiful lands.

MORE STRIKING CLIMATIC CONTRASTS THAN IN ANY OTHER LAND

The climatic conditions of Japan offer contrasts of a more striking character than any other country of similar area in the world. While in the northernmost island we have mainly subarctic features, in the southernmost we find them subtropical. Moreover, on the west coast of the main island we find both those extremes represented in the same region.

The cold, dry northwesterly winds of winter that sweep across from Siberia gather up the moisture over the Japan Sea and deposit it in a snowfall often heavy enough to bury whole villages. Intercommunication between house and house is then maintained only by means of sheltered arcades, and buildings of importance need to be identified by sign-posts stuck in the snow to indicate the "Post-office is below," "The police station will be found underneath this spot." Nevertheless, in the same region the summer is almost tropical in character.



Photograph by A. Nielen

LIKE CLOTHES ON A LINE, THE JAPANESE HANG THEIR CORN OUT TO DRY

This method of ripening and curing grain is necessary in some districts on account of excessive rains and the short summer season.

Again, while the western side of the great mountain mass of these regions exhibits leaden skies and biting winds, on the east, toward the Pacific coast, the winter is nearly always delightfully bright and sunny and snowfalls are seldom seen.

AN AVERAGE OF FOUR EARTHQUAKES A DAY

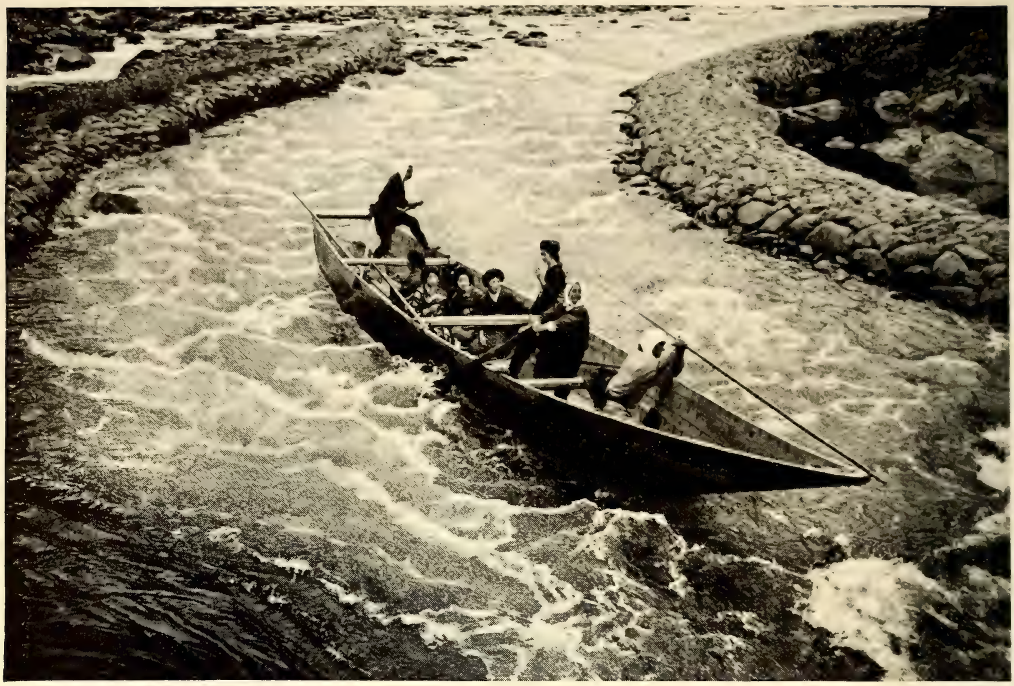
One of the most disturbing features (in every sense) of the natural phenomena of Japan is the frequency of earthquakes. There is an average of four a day, but shocks of a very serious kind only occur once in six or seven years. The consolation is that if they came less frequently they would be more disastrous in their results.

The greatest center of activity is on the Pacific coast, near the Bay of Tokyo, and it is here also that the tidal waves are most destructive. Sometimes the loss of life from the combined agencies has amounted to over 27,000. As many as a quarter of a million houses have been destroyed at once. Active volcanoes, however, provide a safety-valve for the disquieting forces at work below the earth's crust, and consequently the regions where these are found are seldom harmed by seismic shocks.

Typhoons (or cyclones), unlike the earthquakes, can be counted upon with much more certainty, and invariably and appropriately usher in the break up of the summer heat, during the second week in September, though occasionally they appear at other times. This may be counted upon as an absolutely regular fixture. Their effects are usually more destructive on the coast, and occasionally one may find vessels of considerable size deposited high and dry in the back street of a large seaport town.

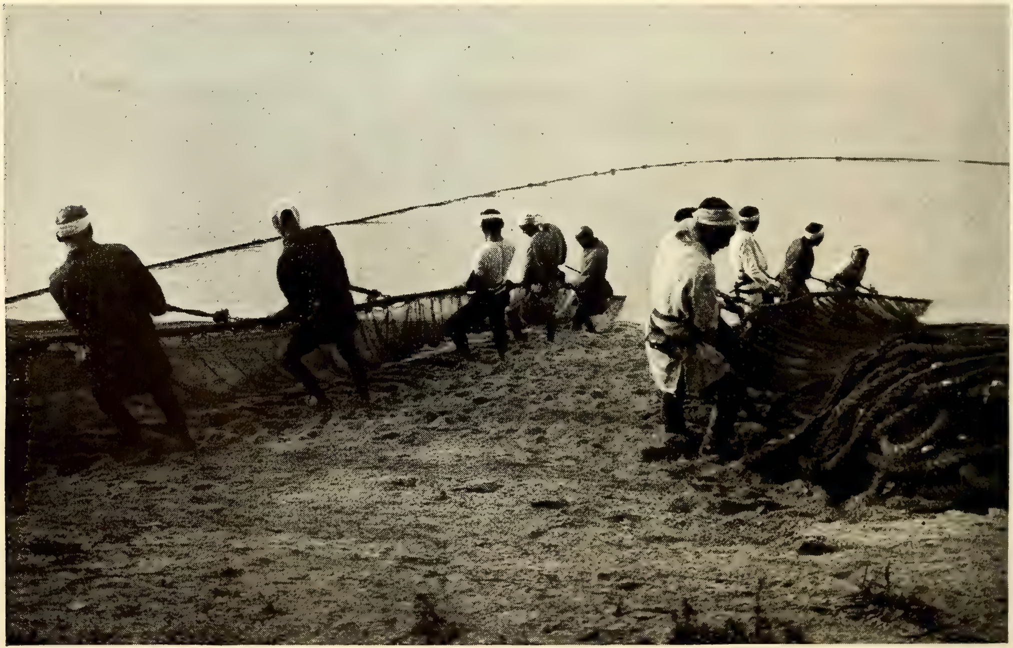
PEASANTS DELIGHT IN HOT SPRINGS

There are more than 1,000 mineral springs to be found in the mountain regions of Japan, and in the more secluded spots they form a feature of peculiar interest. They constitute a great asset to the peasantry in those regions, who resort to them by the thousands, for the sake of health or to kill time pleasantly in the company of their friends. Whatever else may be thought of the alleged fickleness of the Japanese character, it is certain that their love for hot water has never grown cold.



SHOOTING RAPIDS IN JAPAN

Mountain chains which extend throughout the principal islands form a watershed which makes all the rivers of the empire short and in the main swift and of little value as commerce-carriers. They present opportunities for hydro-electric development, however.



Photographs by Kiyoshi Sakamoto

FISHERS DRAWING A NET ON THE BEACH

Japan has a mile of seacoast for every nine square miles of area, as compared with Great Britain's mile to every thirteen square miles.

Photograph by Graham Romeyn Taylor

A BILL-BOARD ADVERTISING WAKANAURA, A POPULAR SEASIDE RESORT NEAR OSAKA

Not only are the Japanese railways clever advertisers, but neat bill-boards at most of the stations show the direction and distance of all places of interest from the local station.

Of one of the most noted sulphur springs it is maintained that all ailments are curable there with the exception of the disease of love!

While in some places one now finds separate compartments reserved for those who prefer to bathe more privately, it is usual in the more primitive places for both sexes to do so together promiscuously. There is here no longer found the dividing cord stretched across the big tank to denote "This side for ladies, that for gentlemen," which at one time, in some of the larger towns, was employed out of consideration for the feelings of "foreigners" on the subject. All is conducted with complete decorum and propriety.

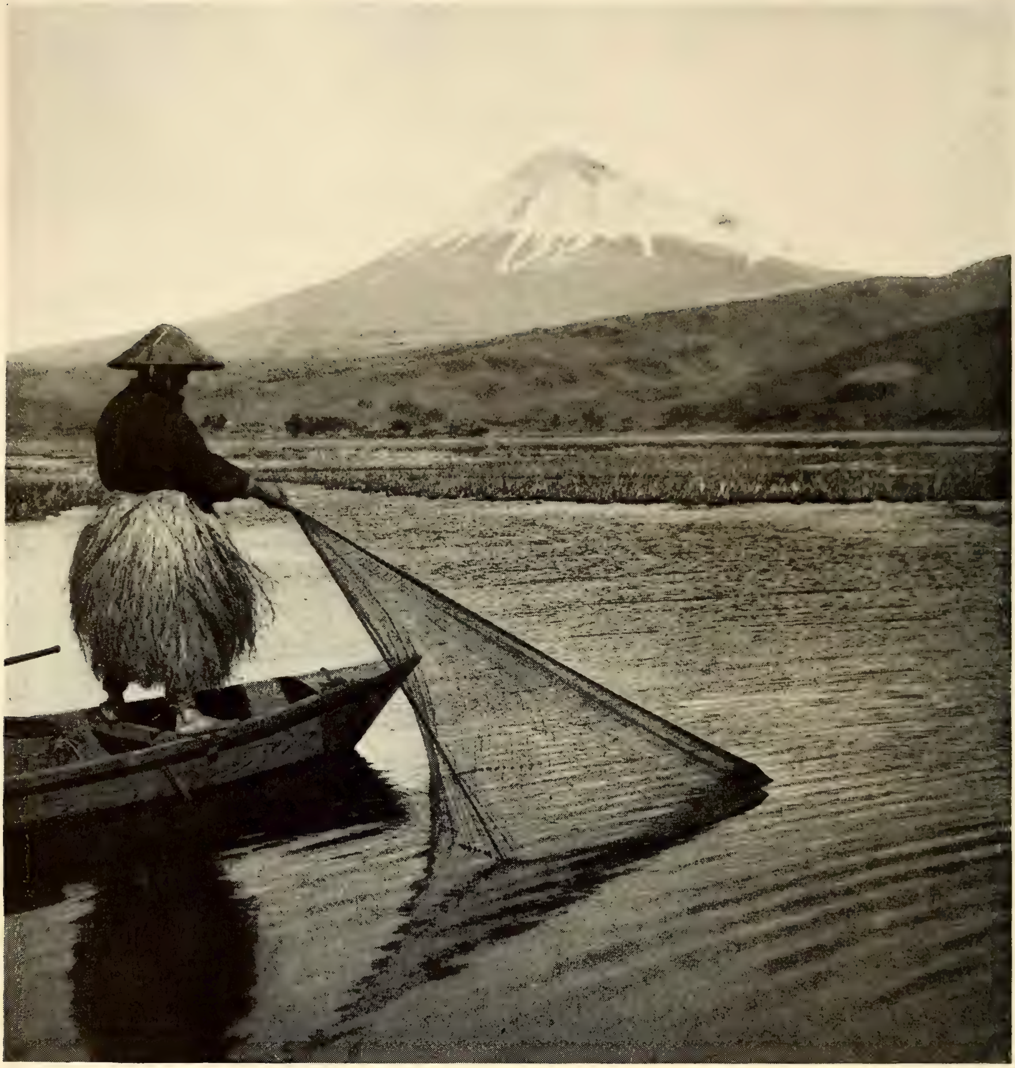
HALF THE VARIETIES OF THE WORLD'S FLORA FOUND IN JAPAN

It is the abundant supply of moisture in every form that is largely responsible for some of the most striking and important features of the Japanese landscape—for a flora that includes half the known varieties of the earth's vegetation in an area only a little larger than that of the British Isles.

We have also to note the countless deeply cleft valleys, whose torrents find their way from high mountain ranges to the sea by narrow channels. After a storm or the melting of the snows of winter, these streams are swollen into broad, resistless floods, whose deltas open out into the ocean half a mile or more in width.

Large tracts of land are thus held in perpetual desolation, though the skill and energy of native engineers are developing methods and resources of riparian progress of growing value. Their efforts are gradually superseding the ancient ways.

Formerly the River God was honored with a handsome shrine, to which the peasantry resorted in the springtime for services of supplication in order to avert the likely destruction of their unprotected rice fields and mulberry plantations by the dreaded storms of early autumn, when the rice harvest was ripening. To-day, one of the chief festivals of such a shrine is that observed in Kofu, capital



Photograph by Kiyoshi Sakamoto

MT. FUJI SEEN FROM LAKE FUJI (SEE ALSO PAGES 81 AND 84)

This, the highest and most beautiful mountain of Japan, is a volcanic cone rising from a sea-level plain to an altitude of 12,400 feet. It is snow-capped at all seasons of the year. The fisherman is wearing a grass raincoat, which covers his shoulders during a shower, but is thrust down to his hips while he is working.

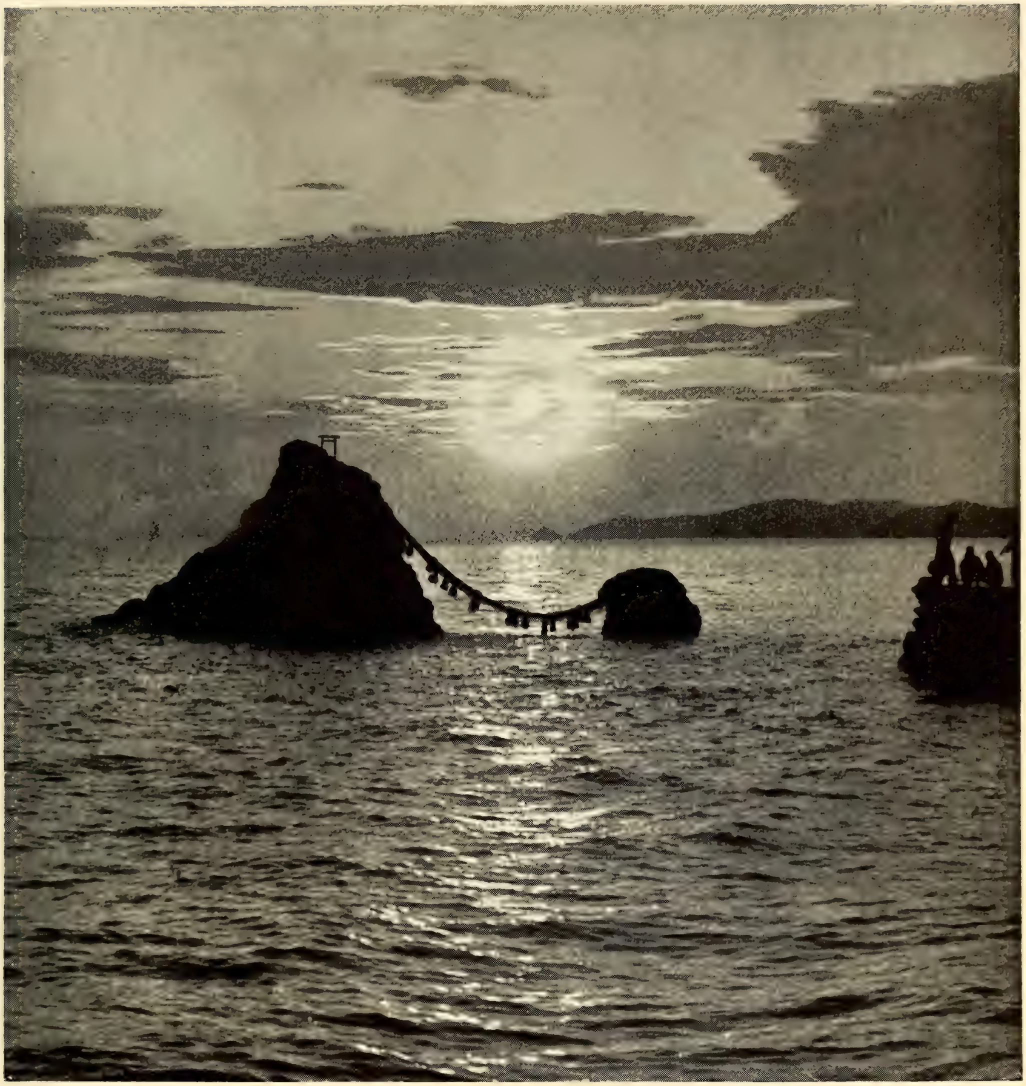
of the prefecture of Yamanashi and commercially one of the most progressive inland cities of the Empire!

A LAND OF UNSURPASSED WATERFALLS

In the beauty and variety of its myriad waterfalls Japan is unequaled. As types of these one may select the famous cascade of Kegon at Nikko and the broad fall of Shiraito, near the foot of Fuji-san.

Kegon forms the outlet of the famous mountain volcanic lake of Chuzenji, in the heart of the region known, from its entrancing loveliness, as Nikko, the "Splendor of the Sun." It falls in an unbroken column of water into its rocky basin 350 feet below. It was noted some years ago as the popular spot for suicide in the case of students disappointed in love or in examinations (see page 80).

Shiraito, on the other hand, forms a broad series of cascades, falling over a semicircular cliff at the foot of the most beautiful mountain in Japan. The pop-



Photograph by Kiyoshi Sakamoto

SUNRISE AT FUTAMI

The "Meoto Iwa," or "Man and Wife Rocks," at Futami are connected with a "shimenawa," or sacred rope. The Japanese worship the rocks as symbols of the God of Happiness or Marriage; hence a *torii,* or shrine-gate, on top of the larger rock.

ular description of this lovely cataract is that the two larger and the 39 smaller falls composing it are the parents and children of a family of 41 members (see illustration on page 81).

The appeal that the countless and varied natural beauties of the scenery of Japan makes to its people, both educated and unlearned, is impossible to realize or to describe, except from personal observation. It exercises a profound and universal influence on the imagination of both rich and poor, whether dwelling in crowded cities or on the countryside

EACH GREAT MOUNTAIN HAS ITS DIVINITY

Wherever any spot of unusual loveliness is found, there rises the appropriate shrine in its honor and there is the need of admiration or adoration offered to its *genius loci.*

Each great mountain has it tutelary divinity, who may be worshiped with fear and trembling for the aversion of

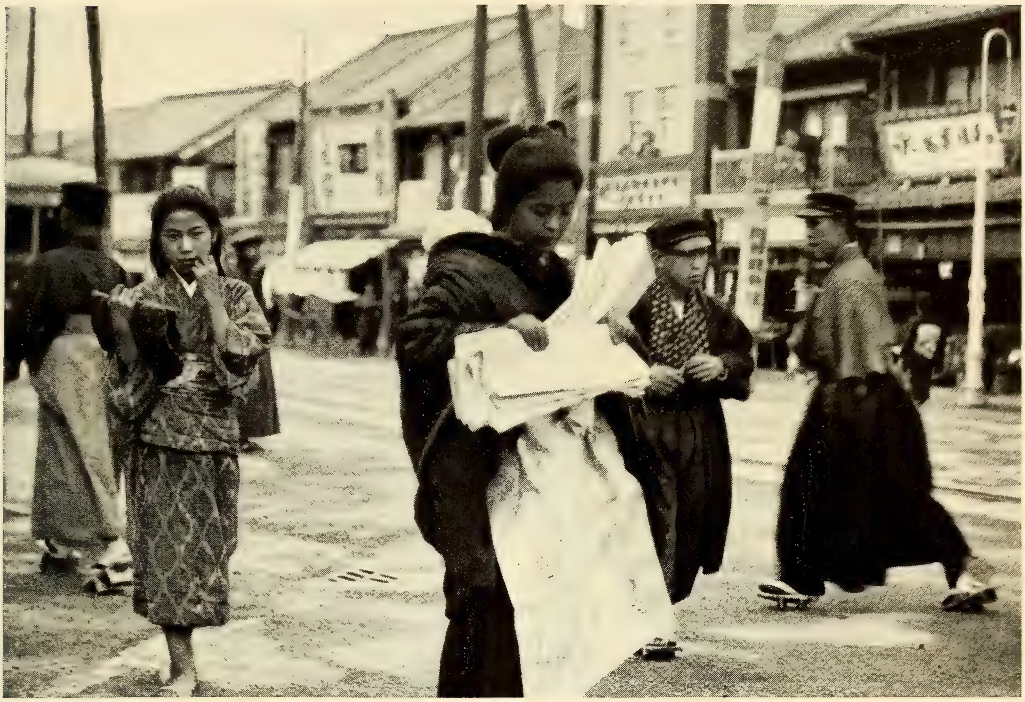
A HUNTER WORSHIPING ON THE SUMMIT OF YARI-GA-TAKE

Next to Fuji, Yari-ga-take (Spear Peak) is the highest mountain in Japan. On every hand its granite spires are streaked with snow at most seasons of the year.

Photographs from Walter Weston

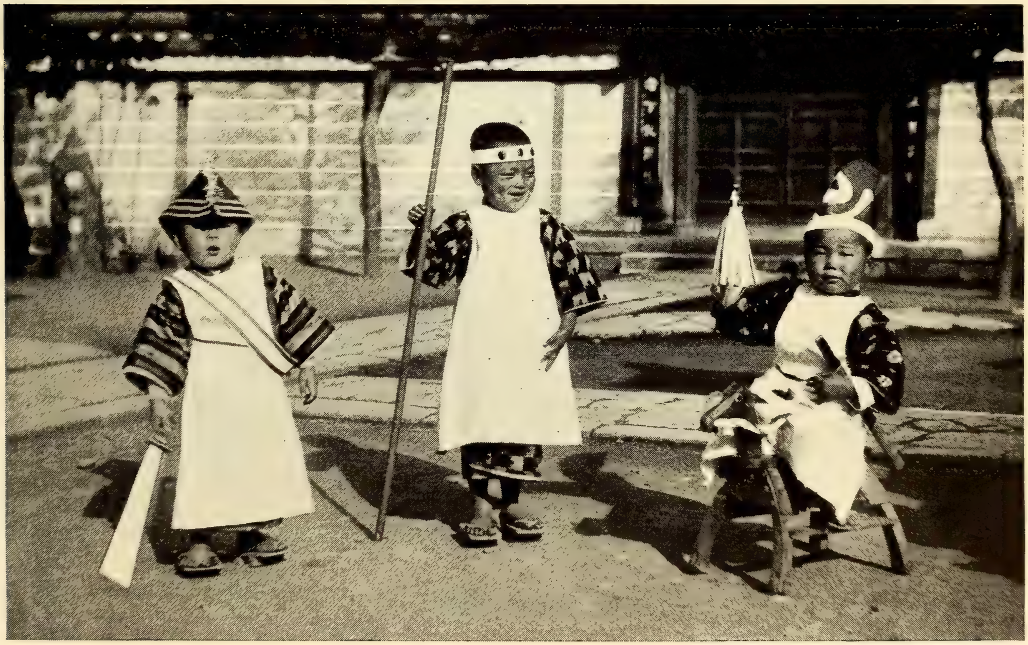
MOUNTAIN PILGRIMS IN A JAPANESE ALPINE VALLEY

These worshipers are bound for the shrine on the summit of the sacred mountain of Ontake. Each mountain has its particular divinity.



A NEWSGIRL WITH A BABY ON HER BACK, ON THE STREETS OF THE JAPANESE CAPITAL

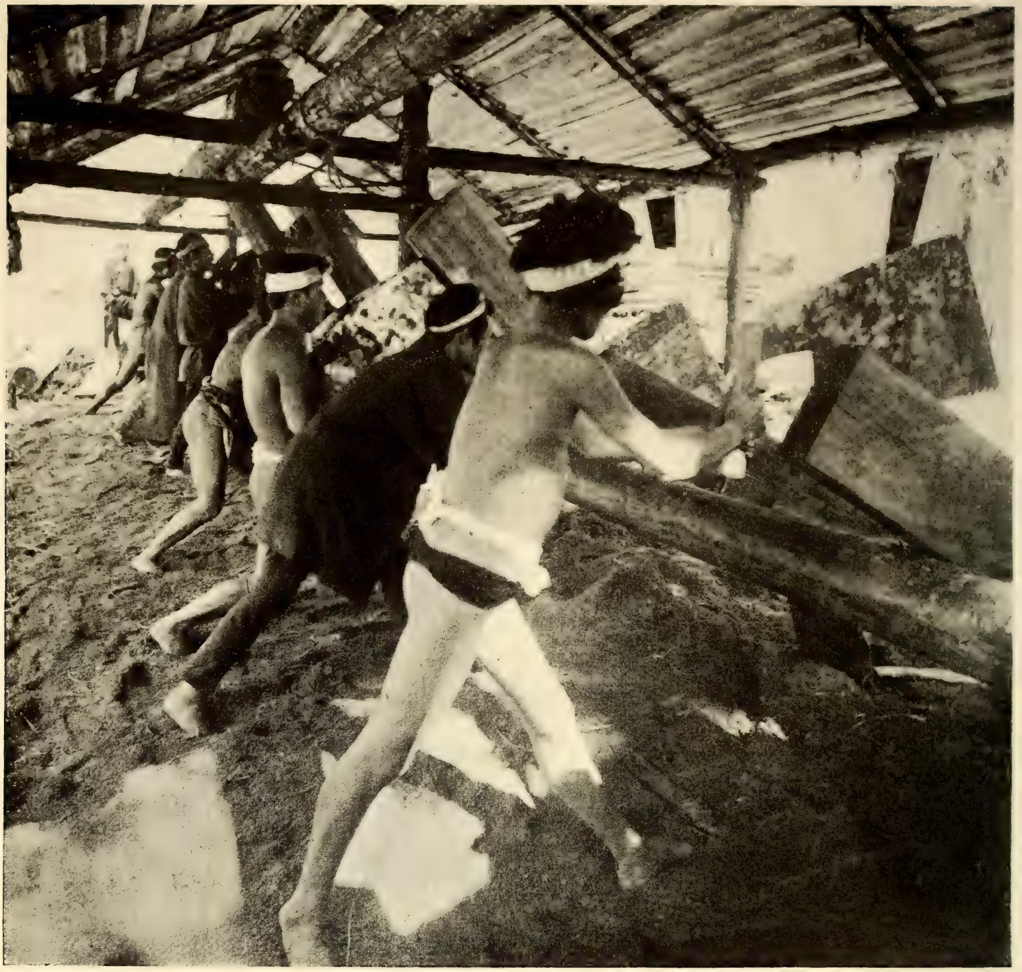
Little girls of ten or twelve go about their work with doll-like babies strapped to their backs, and one often sees them playing hop-scotch while the head of a sleeping infant bobs about in time to the steps.



Photograph by Kiyoshi Sakamoto

YOUNG JAPAN PLAYING AN OLD GAME

Although military caps are most popular with children, the traditions of the two-sworded gentry, the Samurai, are kept alive by actors and motion pictures.



Photograph from J. R. Joy

A JAPANESE SAWMILL

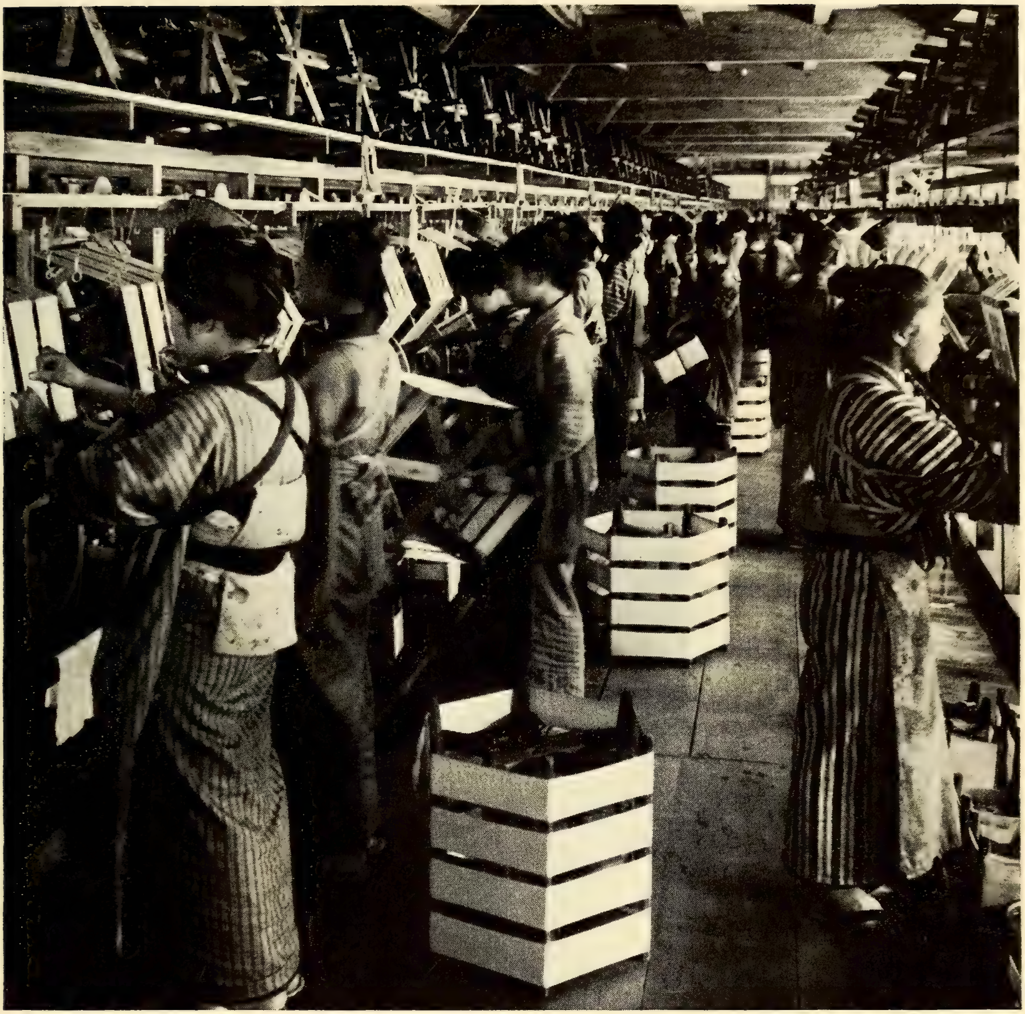
Although Japan has more than three times as much area in forests as in land that is under cultivation, most of the lumber used in the island empire is sawn by hand. Water-power is intermittent along the short rivers, and the use of modern machinery is largely restricted to the coast cities. Even with rising wages, the sawmill does not largely compete with the man-power mill.

the evil his volcanic fires can work, or, in the case of other stately peaks, for the help he can bestow. Indeed, no description of the physical features of the chief mountain systems of Japan would be justly attempted which did not emphasize the actual psychological effects which result from the close contact of a lively and impressionable people with the splendid and varied peaks which overshadow their homes.

As in Greece, so in Japan, the most characteristic feature of the land is its mountains. They spread over the whole country and form a chief part of every view. They have constantly modified the course of historical events, and especially of military operations.

They have served, by limiting facility of intercourse, to conserve the special and peculiar features of the inhabitants of each corner of the land which they shut off from all the rest; for, in spite of the increase of railway communication in the plains, the strongly marked characteristics of many of the different provinces or districts are quite noticeable, even in the present days of transformation, where the mountain barriers hem them in.

It is the hard conditions of life in



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REELING SILK IN ONE OF JAPAN'S MANY MODERN MILLS

More than one-fourth of the world's silk is produced in Japan. Of this a large percentage is sold as raw silk and only about one-sixth of the entire amount is manufactured in Japan.

those wild and inhospitable regions that long ago engendered those habits of frugality, endurance, and self-reliance among an island race immune from invasion, and have rendered the Japanese one of the proudest and most self-satisfied patriots the world has ever seen.

MORE THAN HALF THE PEOPLE LIVE ON THE LAND

No less than three-quarters of Japan is mountain land, to a great extent uncultivated, because uncultivable. The remaining quarter is worked with a minuteness of care and an intensity of energy of which we have little conception and to which none of our industries offers any parallel.

In spite of the growth of industrialism and the migration of so many from the countryside to the towns, still more than half the people live "on the land." Even in feudal Japan, the tillers of the soil ranked next in social status to the Samurai and above the merchants and mechanics. Those were days when Japan was secluded from the world and was forced to be self-supporting. In order to make the most of her resources, all available ground was laid under contribution.

A story is told of a farmer who terraced his own little hillside in no less than eleven tiers. At length he sat down to survey the results, but to his dismay he could see only ten terraces below him. The eleventh was invisible; he was sitting on it!

THE EFFECT OF MOUNTAINS ON THE JAPANESE

It is, then, in the subjugation of the soil that the Japanese people (the peasantry, old and young, number more than 25,000,000) develop so much of their unwearying patience, perseverance, and cheerfulness. Moreover, it is among the soldiers recruited from among the hillmen that some of the finest campaigners are found.

During the Russo-Japanese War in Manchuria it was found that in districts where long marches over a route chiefly leading along goat paths or across trackless gullies and crags, each man having to find his own way and rejoin his company on the farther side, the native mountaineering habits of the lower ranks invariably enabled them to select the most accessible line of country.

From what I have already said, I hope I have made it clear that there is an intimate connection between the physical features of Japan and the psychological characteristics of the Japanese. A brief notice of the mountains in particular will help to illustrate their influence on the inhabitants.

Through each of the chief islands of Japan there runs a solid backbone of mountains, which, taken together, constitute three great mountain systems.

The first, or northern, of these is known as the Russian, or Karafuto, system. Karafuto is the Japanese name for Sakhalin and means the "Wave-land," in allusion to its mountainous character. Passing through Karafuto, it traverses Hokkaido (Yezo) and reappears in the mainland, which it penetrates to its center in the provinces of Kōshū, Shinshū, and Suruga.

The second, or southern, is known as the Chinese, or Kuenlun, system. This originates in the Kuenlun Mountains of the central Asian plateau and runs across central China by way of the Peling range, to reappear in the southern islands of Japan, Kyūshū and Shikoku. This system is then continued until it meets the northern, or Karafuto, system in the broadest and central part of the mainland. It is here that the profoundest valleys are cleft and the mountain summits rise to their loftiest heights in the varied and picturesque ranges known as the "Japanese Alps."

The conflict of these two systems has resulted in terrific upheavals, and then, like a mighty wedge driven in between them, there runs a vast transverse fissure, crossing the mainland of Japan at its broadest span, from the Sea of Japan to the Pacific Ocean. It is known as the Fossa Magna, or the Fuji belt, and throughout its entire length a line of erupted volcanoes has burst forth, stretching across the whole width of the island and passing southward through the beautiful hills of the famous Hakone district into the Pacific Ocean in "The Seven Islands of Idzu."

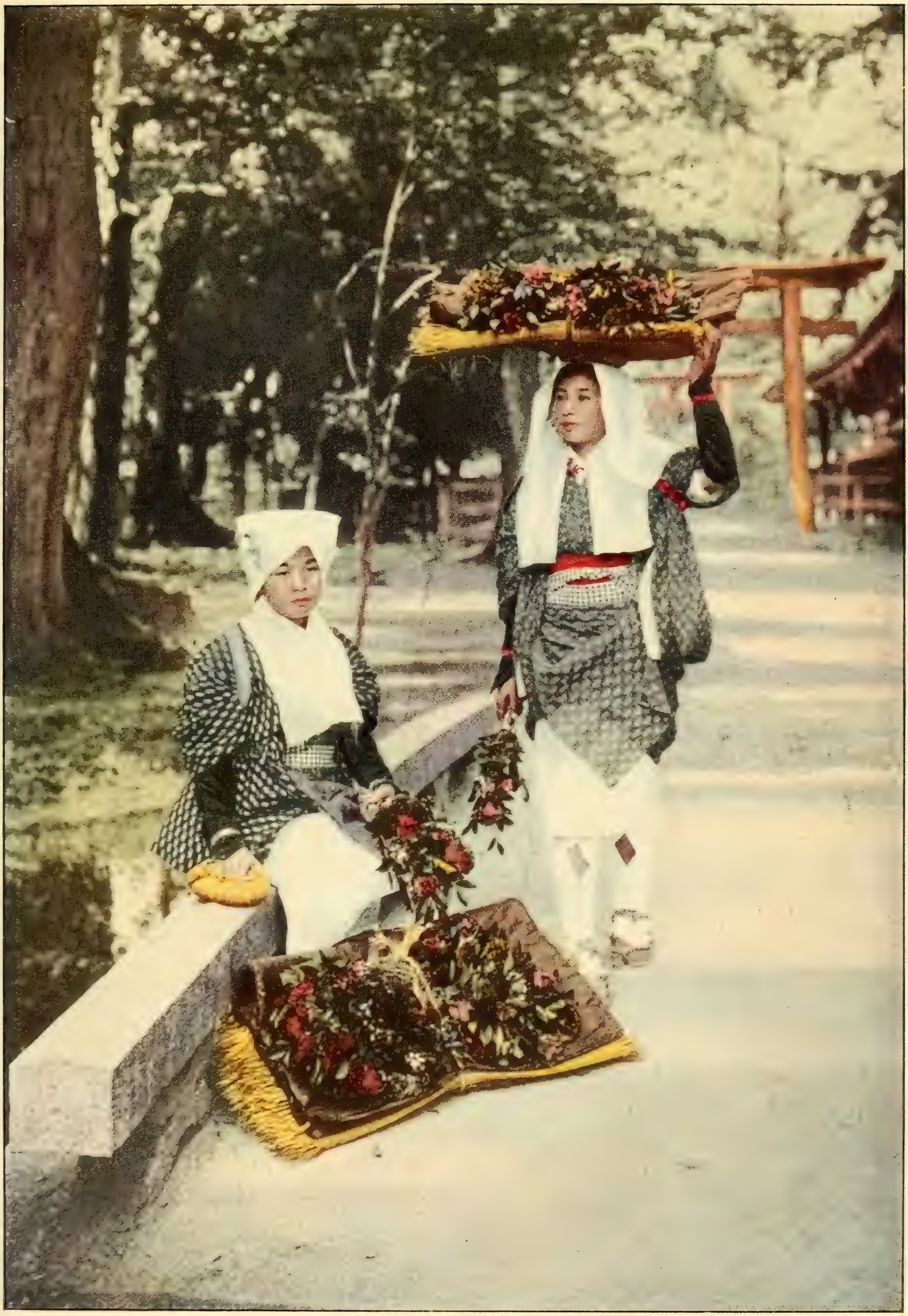
As a result of the mingling of these different ranges, we have that extraordinary variety of form and structure which gives to Japanese mountain landscape its most romantic and characteristic charm.

Mighty volcanoes, extinct, quiescent, or active, alternate with great battlements and spires of granite, or with sharp-pointed, isolated monoliths of harder rock.

VISCOUNT BRYCE'S TRIBUTE TO JAPANESE MOUNTAINS

With this variety of outline we find vivid examples of those other factors to which the scenery owes so much—the extreme variations of temperature, the abundance of moisture, and the erosive power of the mountain torrents; and if to these we add the effect of a clear sky and brilliant sunshine during a considerable portion of the year, particularly in spring and autumn, we have the secret of that extraordinary charm of landscape of which Viscount Bryce recently wrote, that "there is probably no other country that exhibits such an endless variety of natural beauty in the shapes of the mountains and in the rich luxuriance of the trees and flowers."

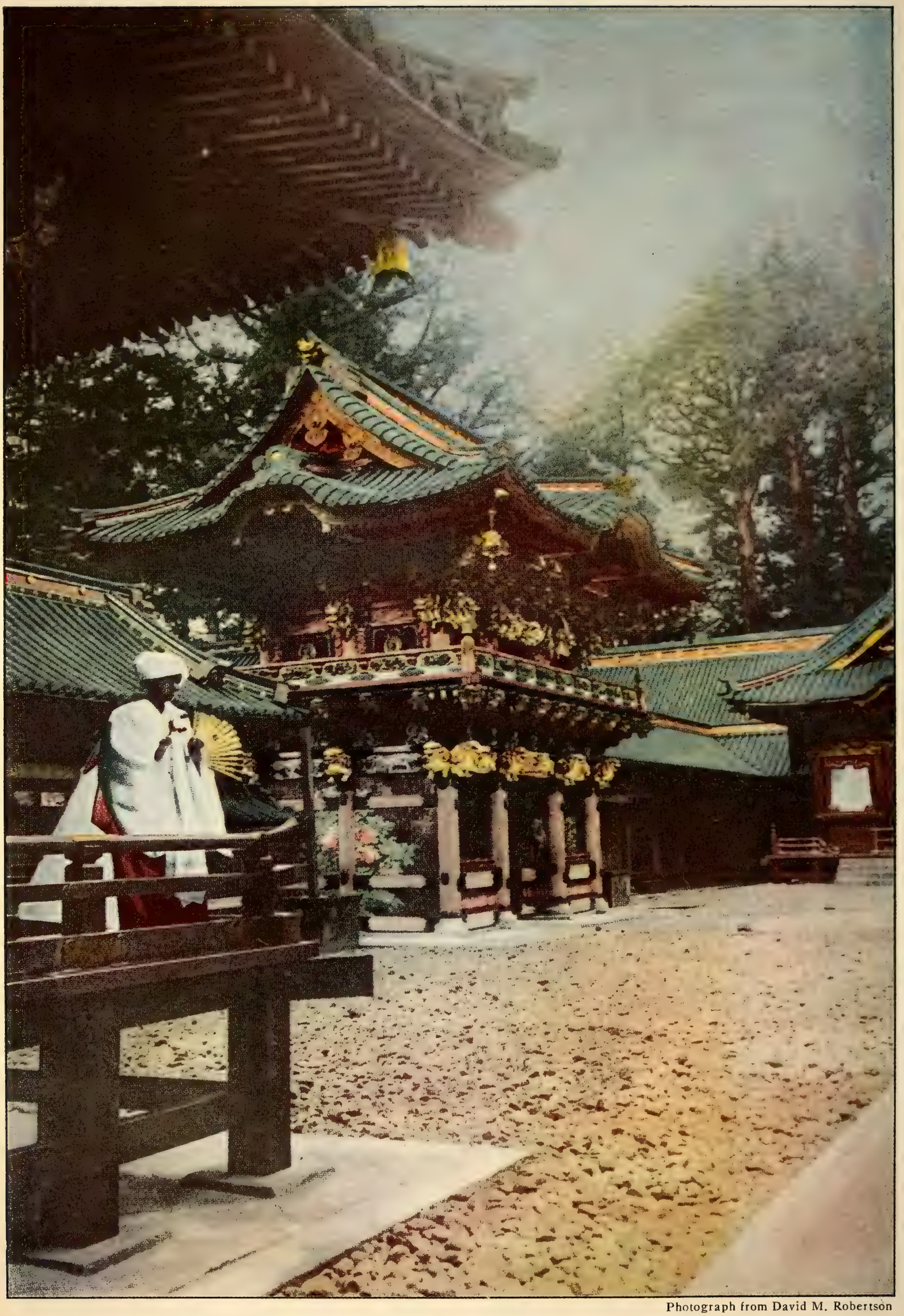
There is no established evidence as to traces of glacial action yet found in the great Alpine ranges of central Japan.



Photograph by Kiyoshi Sakamoto

JAPANESE FLOWER VENDERS—WALKING BOUQUETS

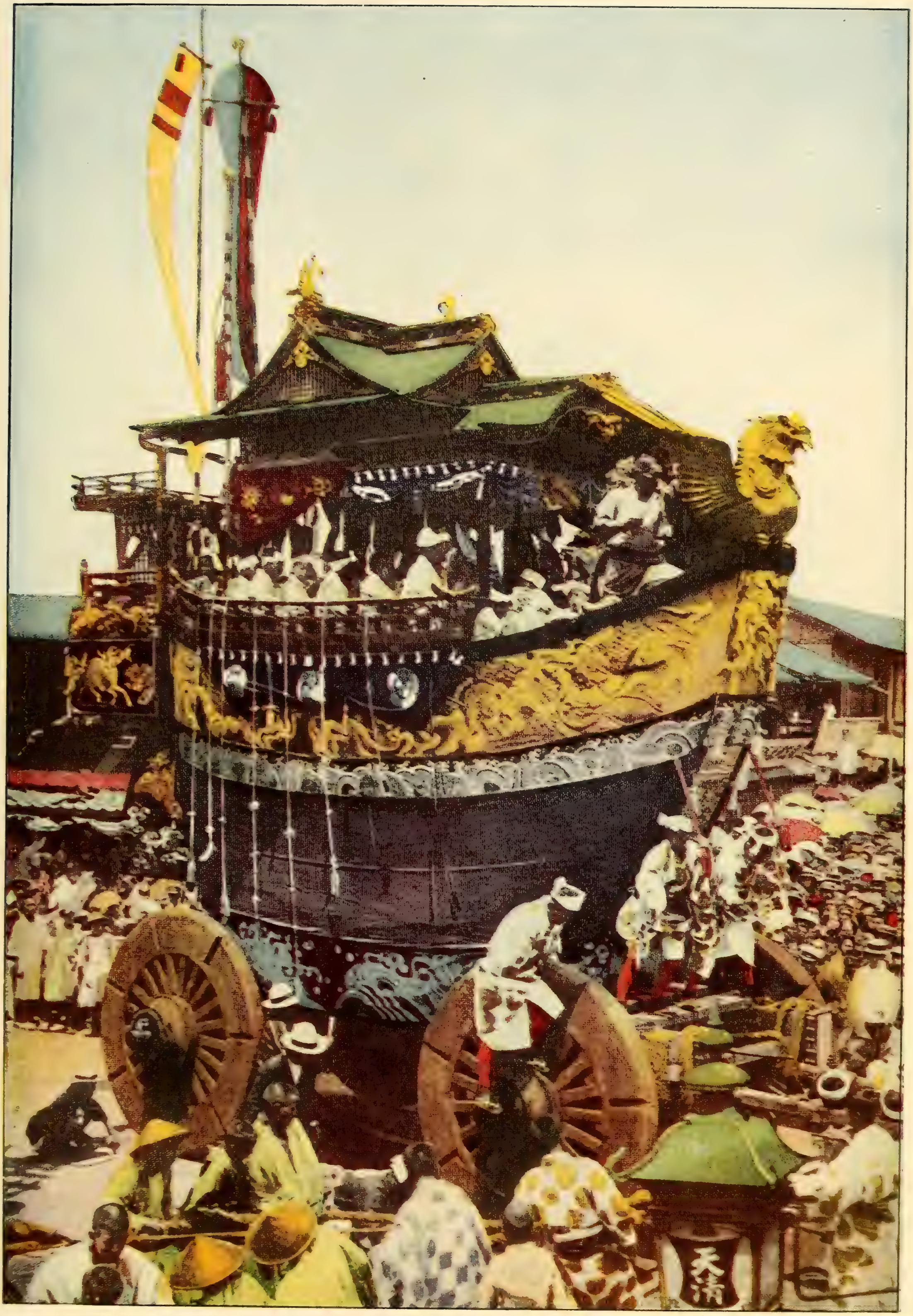
A flower, the gift of sun and soil, has sacred significance to the Japanese, who tell their calendar in blossoms. First in spring, as herald of the new year, comes the plum, loved of the nightingale; then the cherry blossom, bloom of royalty, followed by the purple plumes of the wistaria, the water-haunting iris, the peony, flower of prosperity, the lotus, suggestive of spirituality, and finally that autumn glory, the chrysanthemum, which native floriculturists have developed in 269 color varieties.



Photograph from David M. Robertson

"THE MORNING TILL NIGHT GATE" OF THE IYEYASU TEMPLE, AT NIKKO

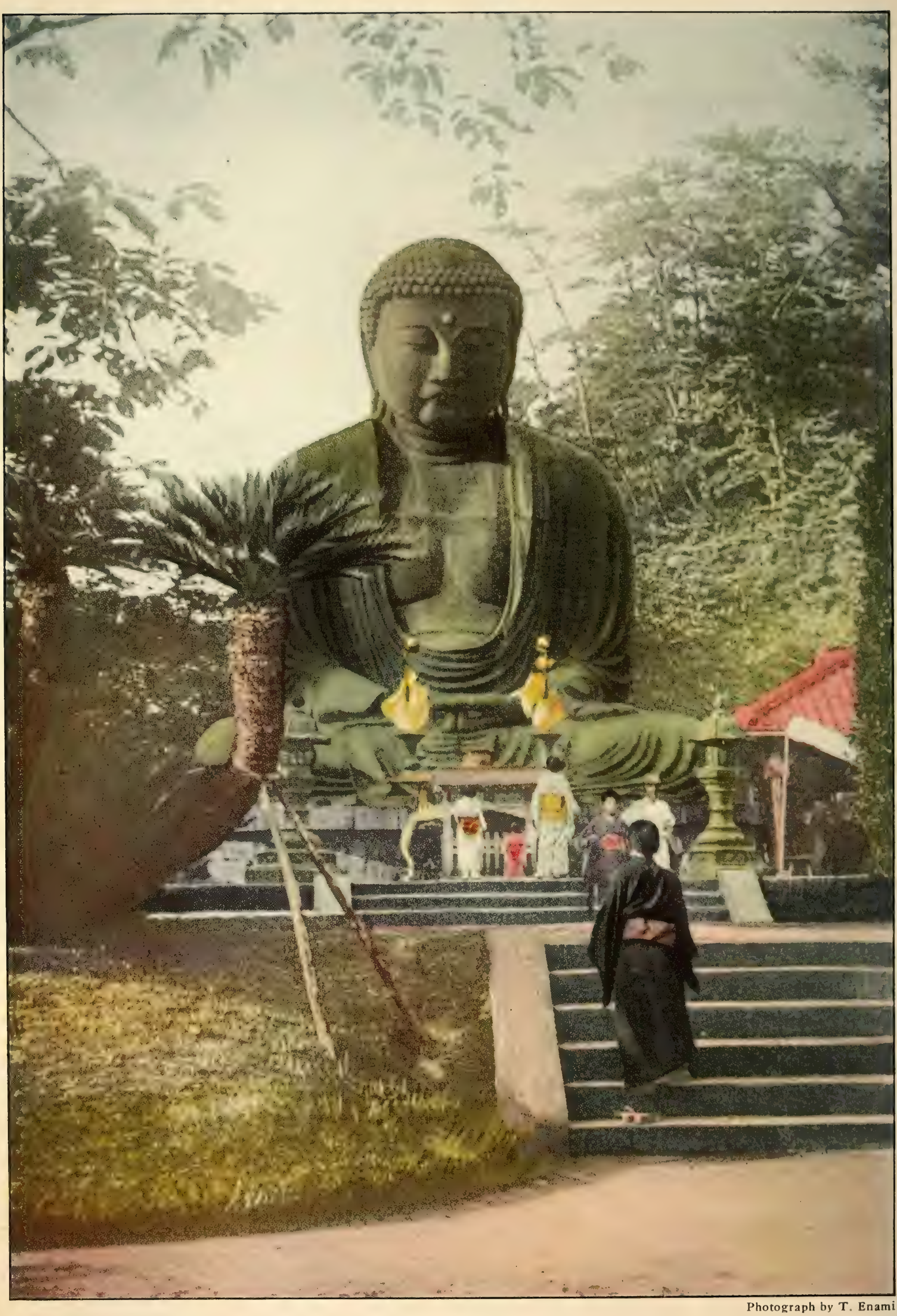
"On the declivity of the Holy Mountain of Nikko, under cover of a dense forest and in the midst of cascades whose roar among the shadows of the cedars never ceases, is a series of enchanting temples made of bronze and lacquer with roofs of gold."—Pierre Loti. There is a Japanese proverb which says, "He who has not beheld Nikko has no right to make use of the word *splendor*."



Photograph by Kiyoshi Sakamoto

A FESTIVAL CAR IN THE STREETS OF KYOTO

The third city of Japan is famous for its beauty contests among the geishas, and for its street processions, in which towering cars of ornate design, laden with merry-makers in multihued garments, are a spectacular feature. The celebrants do not manifest their greatest pleasure by noisy demonstrations, but by silence.



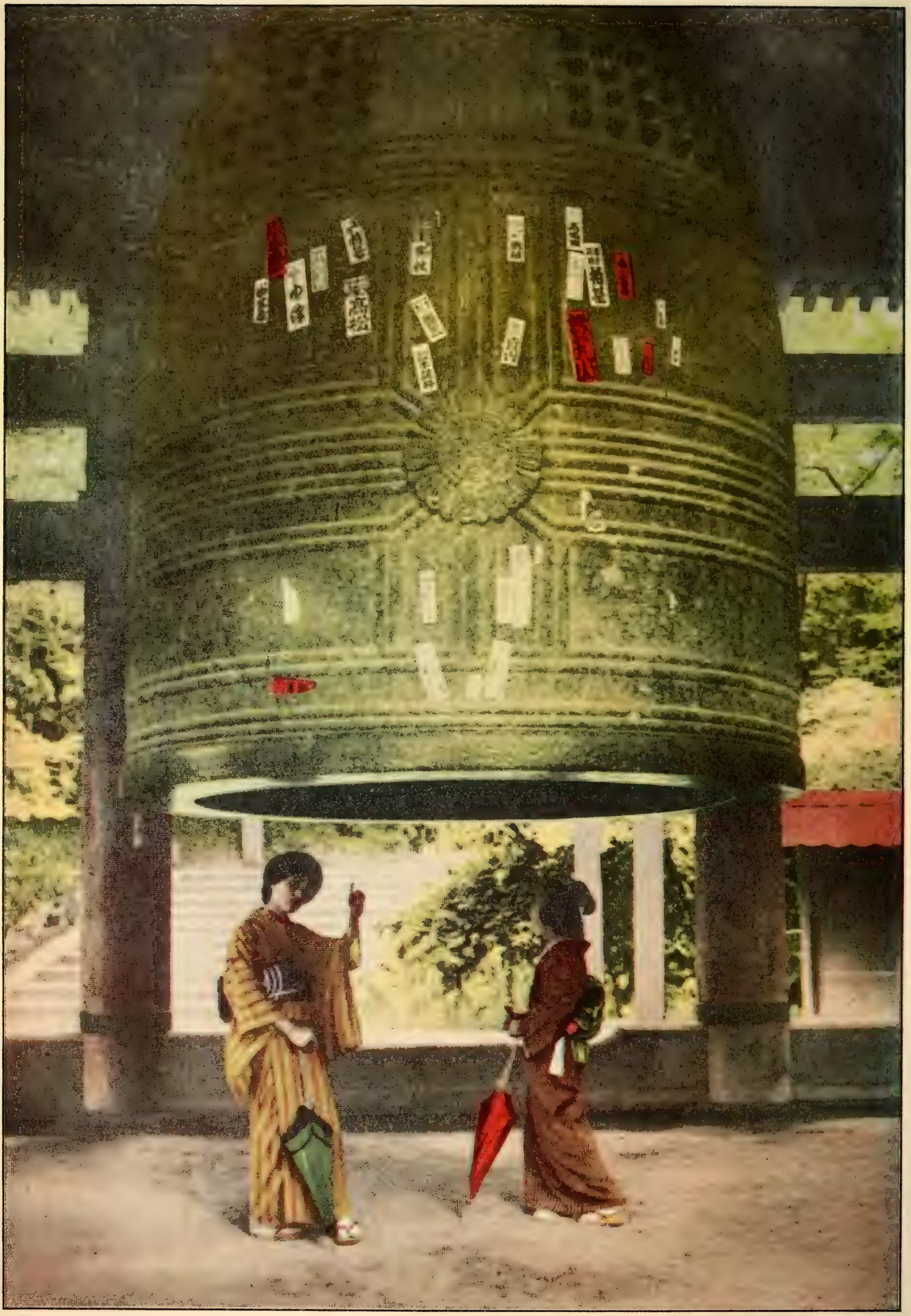
Photograph by T. Enami

THE GREAT BUDDHA OF KAMAKURA

The site of a vanished capital, Kamakura is said to have sheltered more than 700,000 souls in the heyday of its glory. Today, it is a humble fishing village, having as its sole claim to fame this great bronze Daibutsu, the seated Buddha, with eyes of pure gold and massive boss of silver on its forehead.

A JAPANESE FARMER GIRL

There are five and one-half million farm households in Japan, and their fields, which seldom exceed two and one-half acres in extent, resemble neatly planted gardens in miniature, so precious is every inch of ground. Man, woman and child lend a hand at cultivating and harvesting.



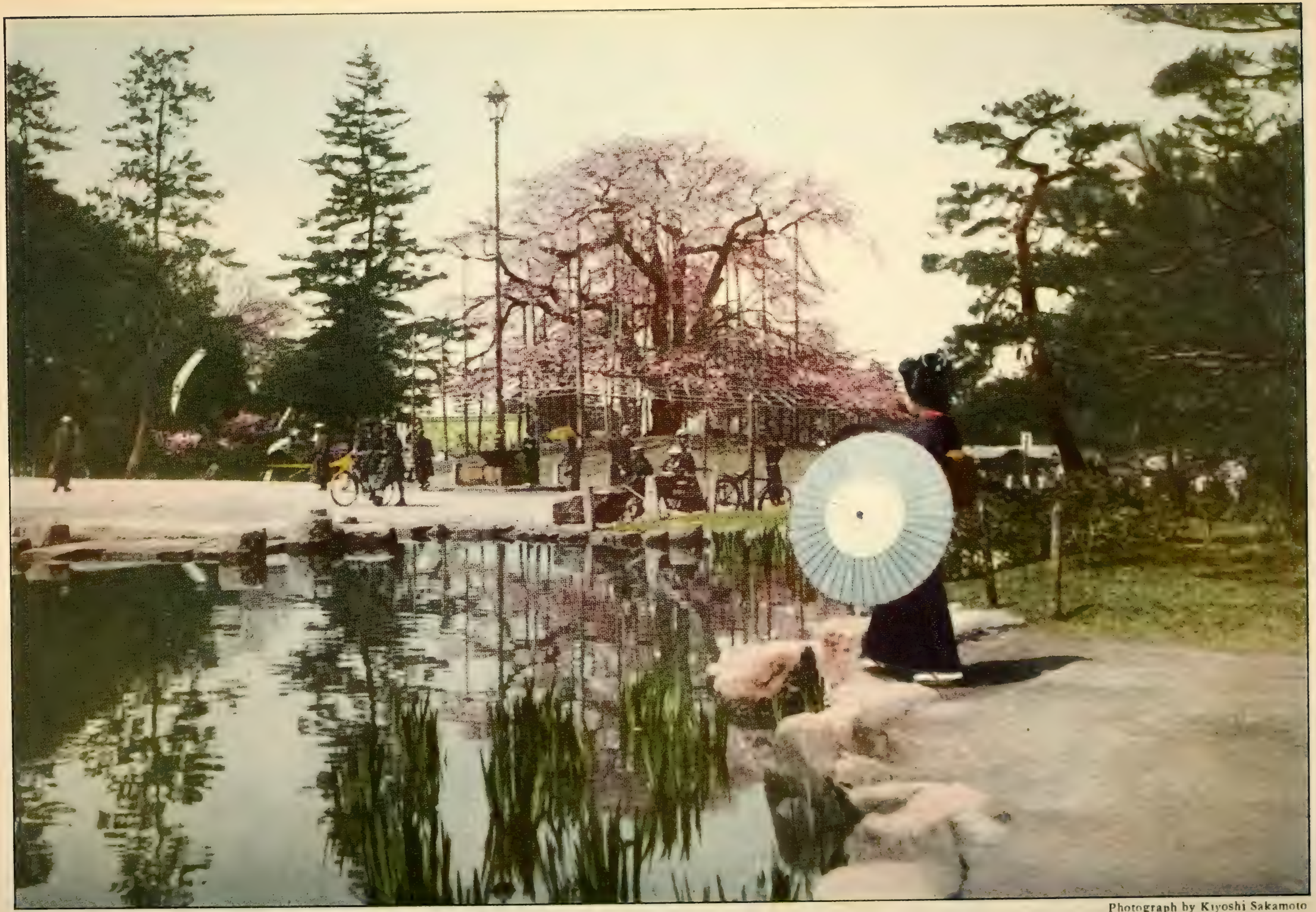
Photograph by Kiyoshi Sakamoto

THE GREAT BELL OF THE CHION-IN TEMPLE IN KYOTO

At the height of the flower season, in April, when all Japan is in festive mood, the air of Kyoto is flooded with the melodic peals from this deep-throated bell. At a distance in the stillness of the dawn, one cannot tell whence come its soft reverberations.

THE CLAM DIGGER LIKES HER WORK

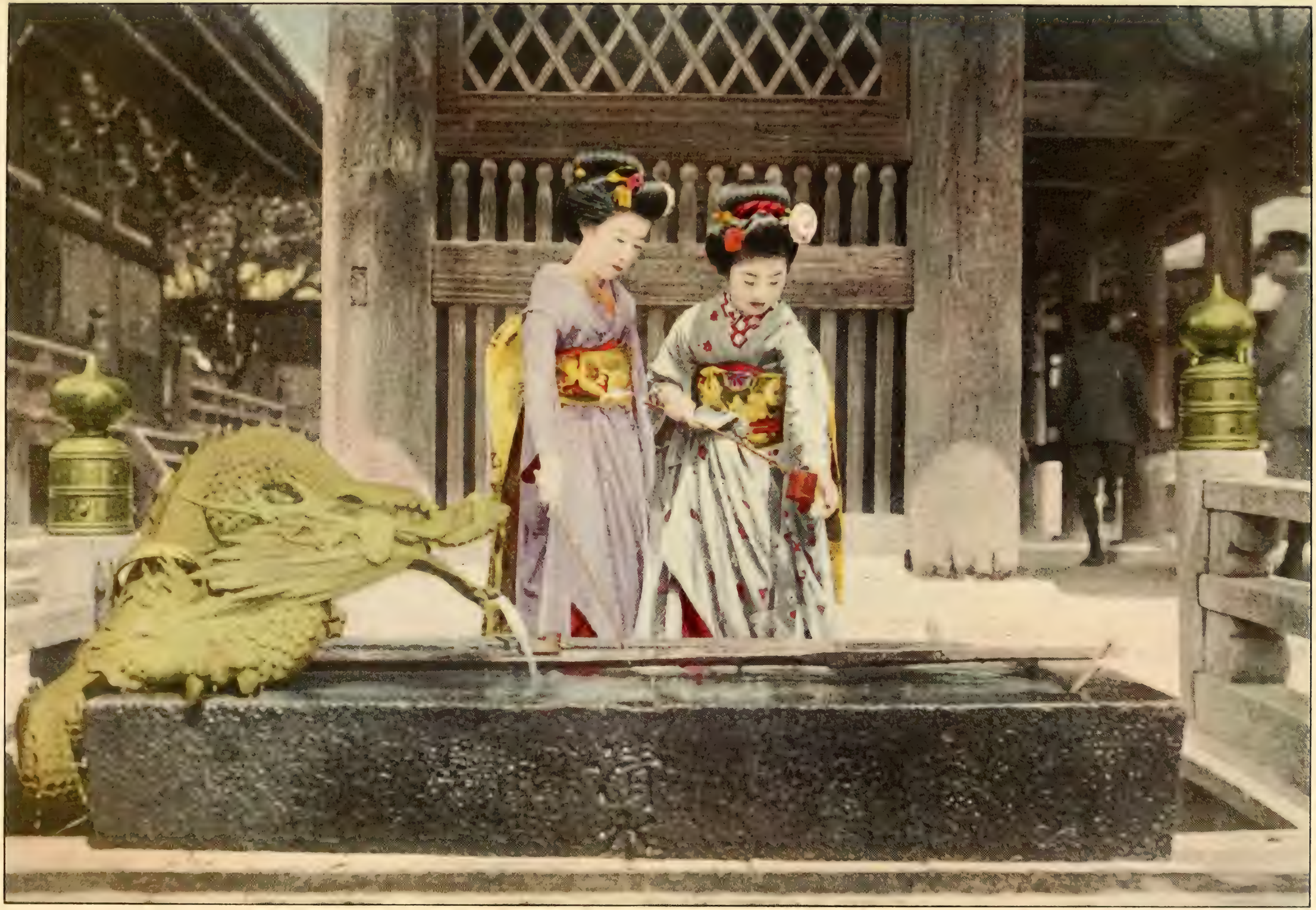
Two and one-half million people of Japan look to the sea for a livelihood, and there are more than 400,000 fishing craft which ply the surrounding waters. Fishermen's widows and orphans abound in every seaside village, for the storm takes an annual toll of a thousand seafarers in small boats.



Photograph by Kiyoshi Sakamoto

CHERRY BLOSSOM TIME IN KYOTO, MARUYAMA PARK

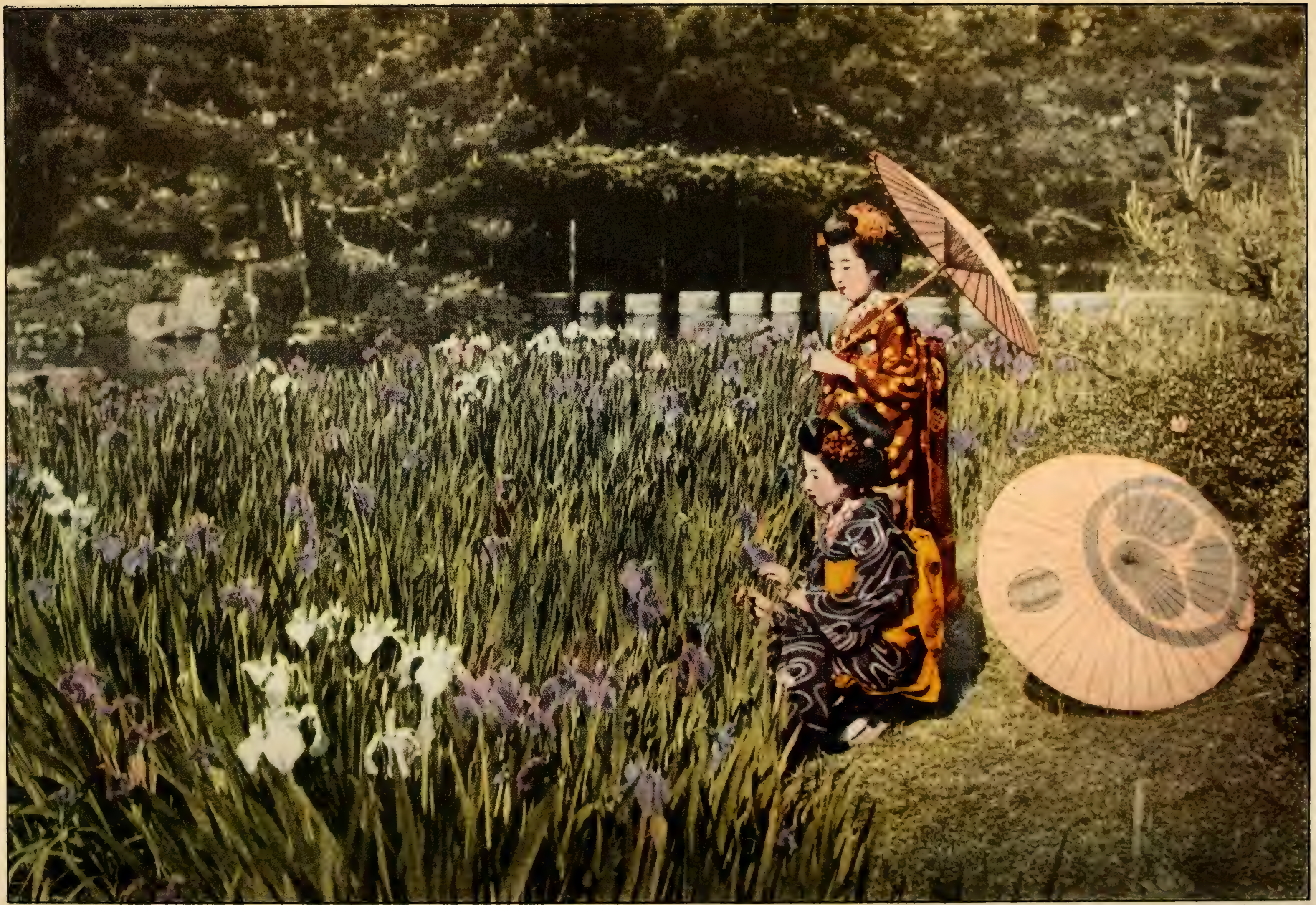
One of the chief attractions of this popular resort of the people of Kyoto, which was the capital of Japan for more than a thousand years, is a large cherry tree with drooping branches Here at night, in the latter part of April, thousands gather to see the blossoms by torchlight



Photograph by Kiyoshi Sakamoto

JAPANESE GIRLS LAVING THEIR HANDS BEFORE WORSHIPING IN THE KIYOMIDZU-DERA, KYOTO

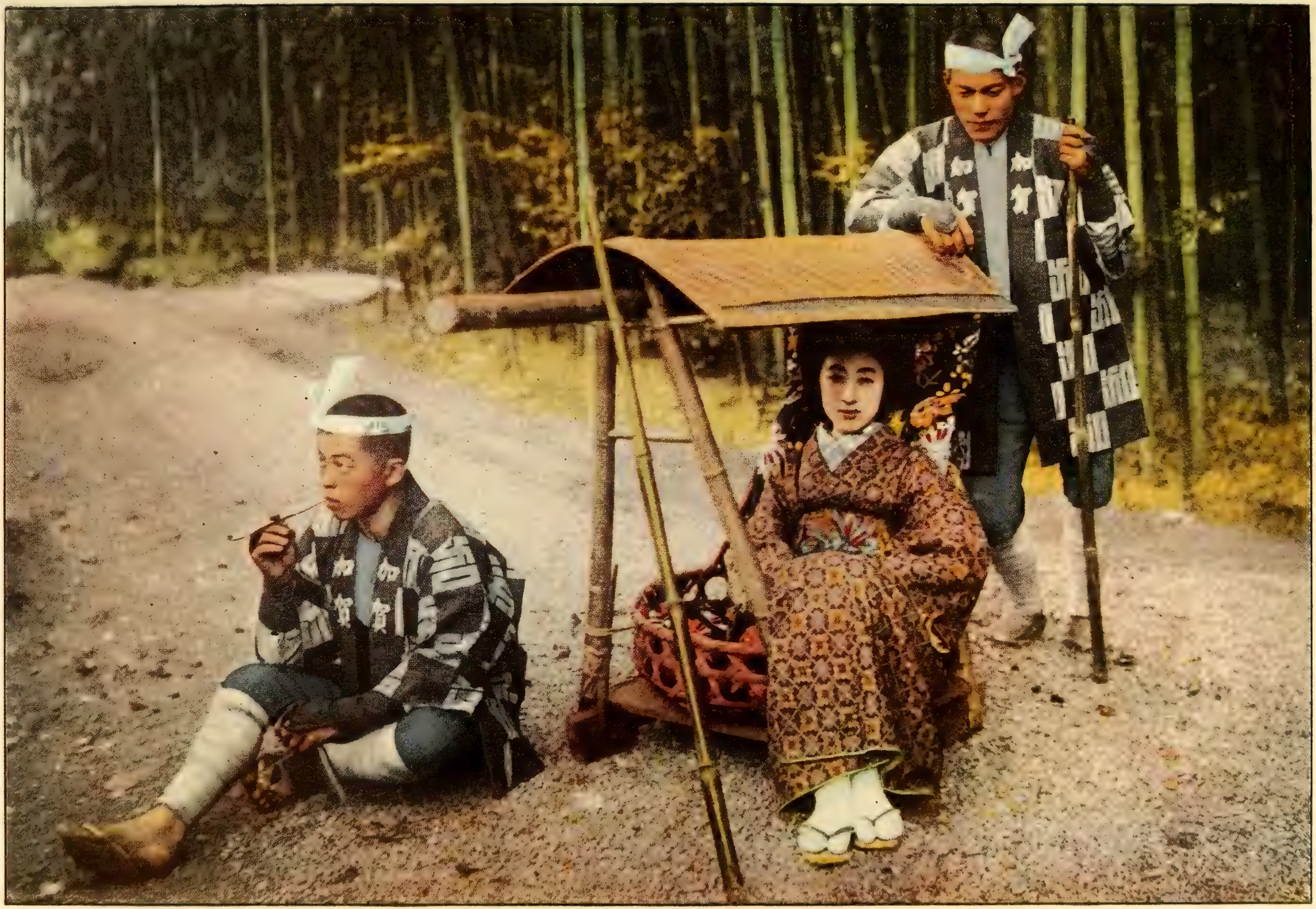
This temple is dedicated to Kwan-on, the Japanese god whose famous image has eleven heads and a thousand hands The original buildings, erected many centuries ago, were destroyed by fire and only the image of Kwan-on was saved.



Photograph by Kiyoshi Sakamoto

GATHERING IRISES IN A JAPANESE GARDEN

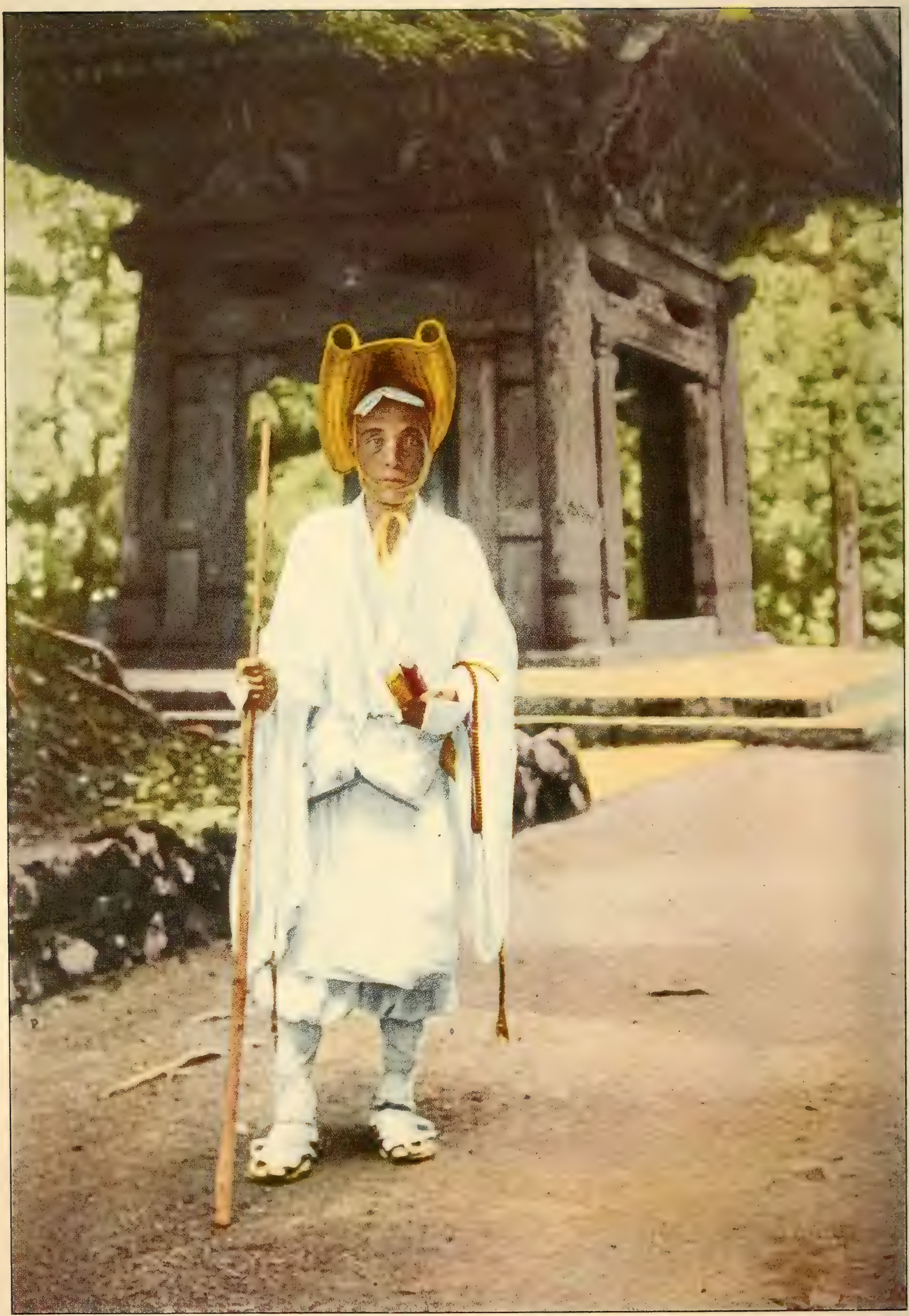
A week in June is set aside for the iris fêtes. Among the most famous iris gardens of the Land of the Rising Sun are those in Hori Kiri, where acres of these fleurs-de-lis form a marvelous carpet of varicolored blossoms.



Photograph by Kiyoshi Sakamoto

A JAPANESE LADY AND HER PALANQUIN BEARERS

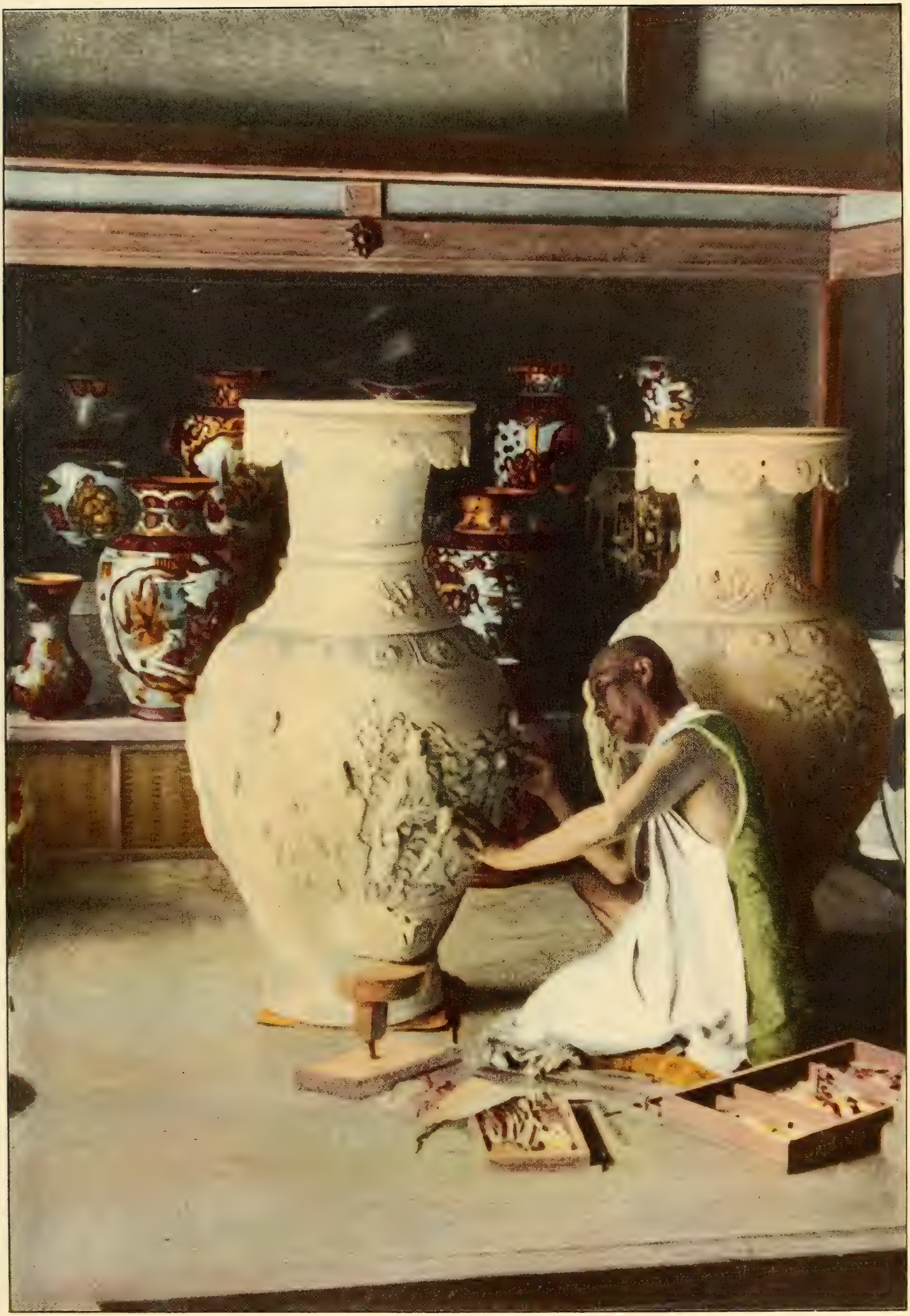
Long before an American missionary devised the jinrikisha as a vehicle for his invalid wife, the wealthy Japanese traveled in palanquins, the oldest style of carriage in Nippon. The Japanese attribute the invention of the jinrikisha, or kuruma as they call it, to an elderly paralytic gentleman who lived in Kyoto fifty years ago.



Photograph by Kiyoshi Sakamoto

A PRIEST-DOCTOR OF OLD JAPAN

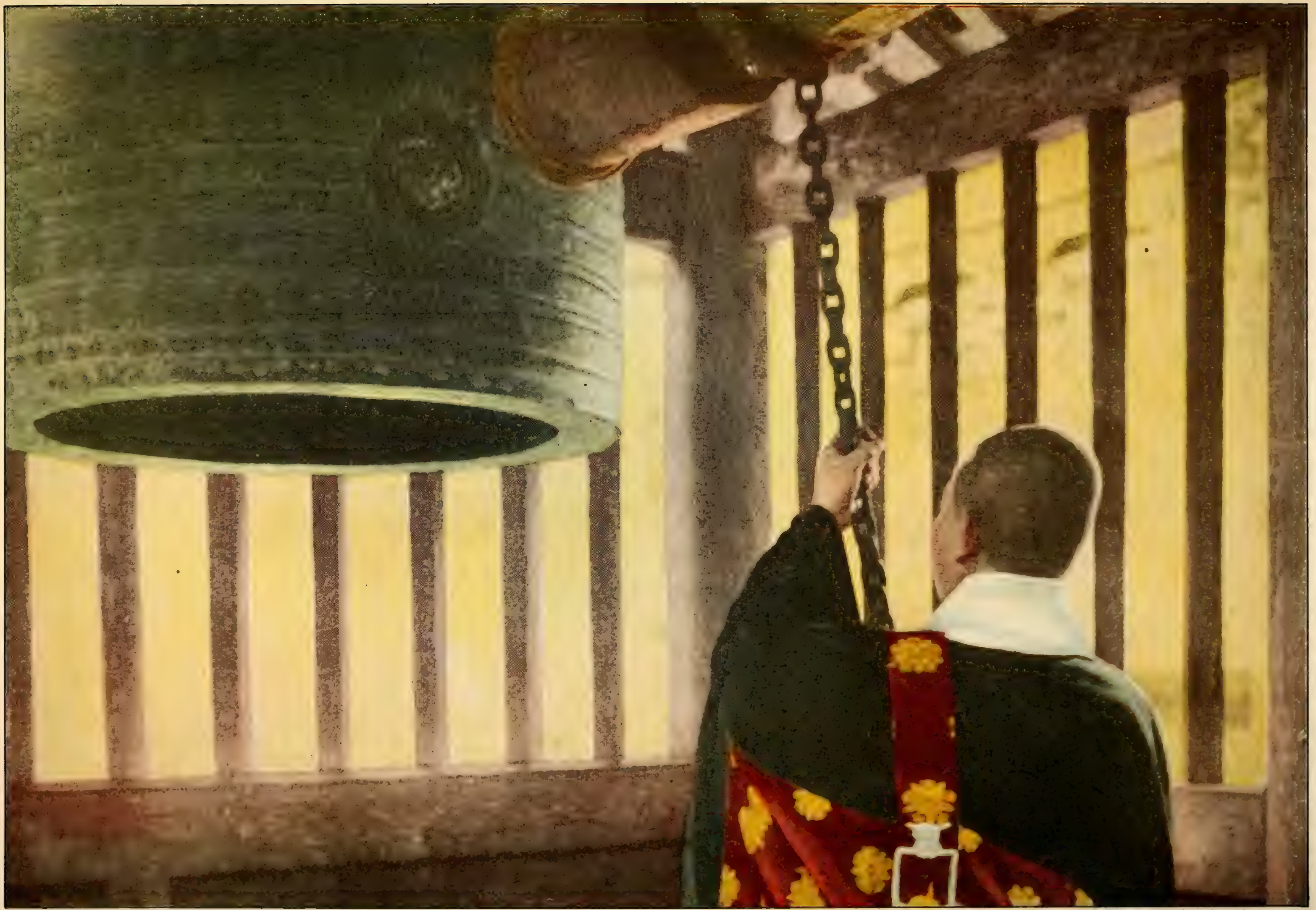
Living in isolated huts "beyond the influences of the miserable world," these religious mendicants, who are vegetarians and celibates, come to town and make their way from gate to gate, praying in sing-song fashion for gifts of money or rice in exchange for blessings for the sick.



Photograph by Enami

A CERAMICS CRAFTSMAN

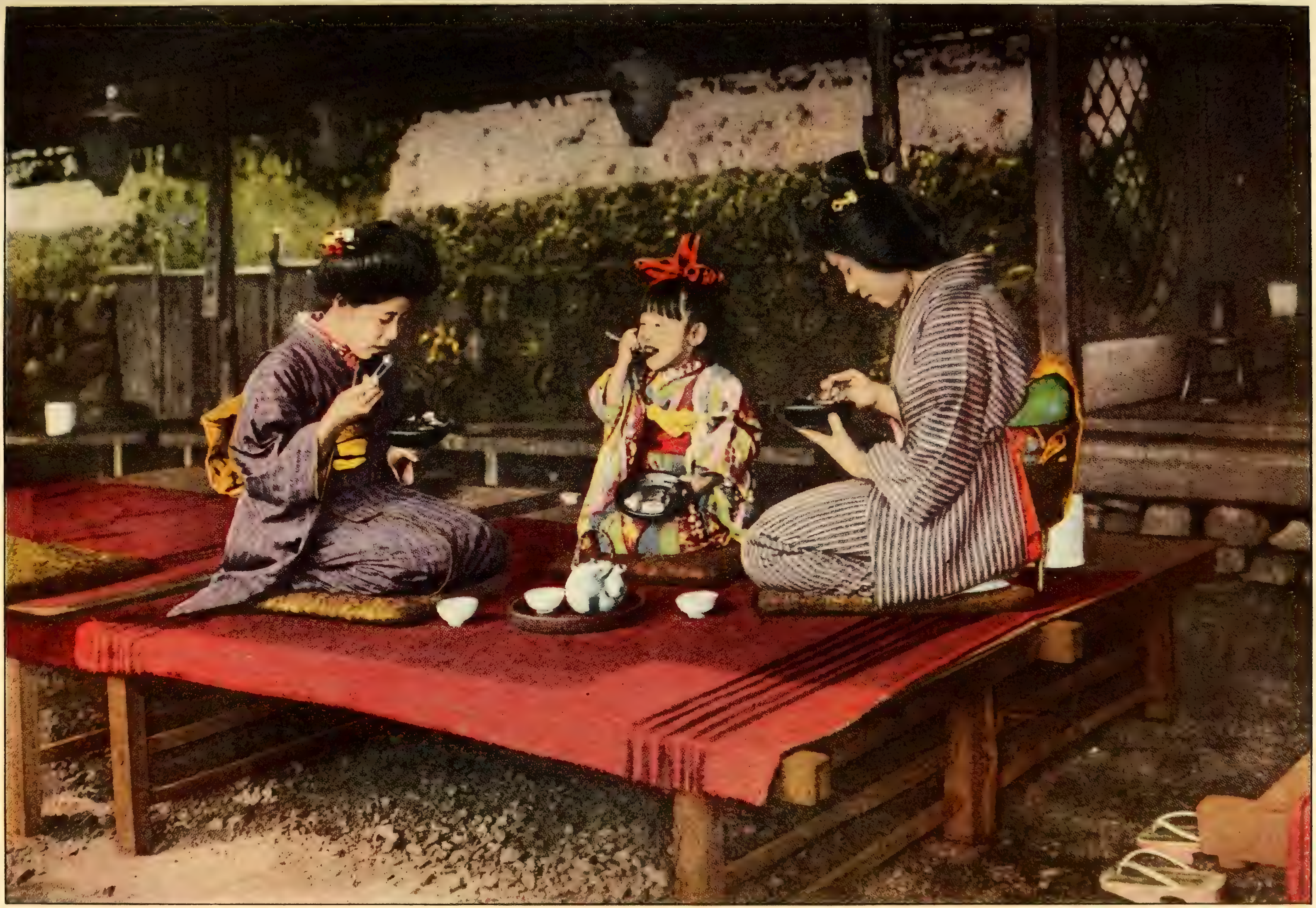
While quantity production has cheapened the quality of the output in many of Japan's famous porcelain centers, there still remain artists capable of producing the finest examples of an ancient handicraft. America is the most discriminating market for Japanese cloisonné ware.



Photograph by Kiyoshi Sakamoto

"FOR THE TEMPLE BELLS ARE CALLIN'"

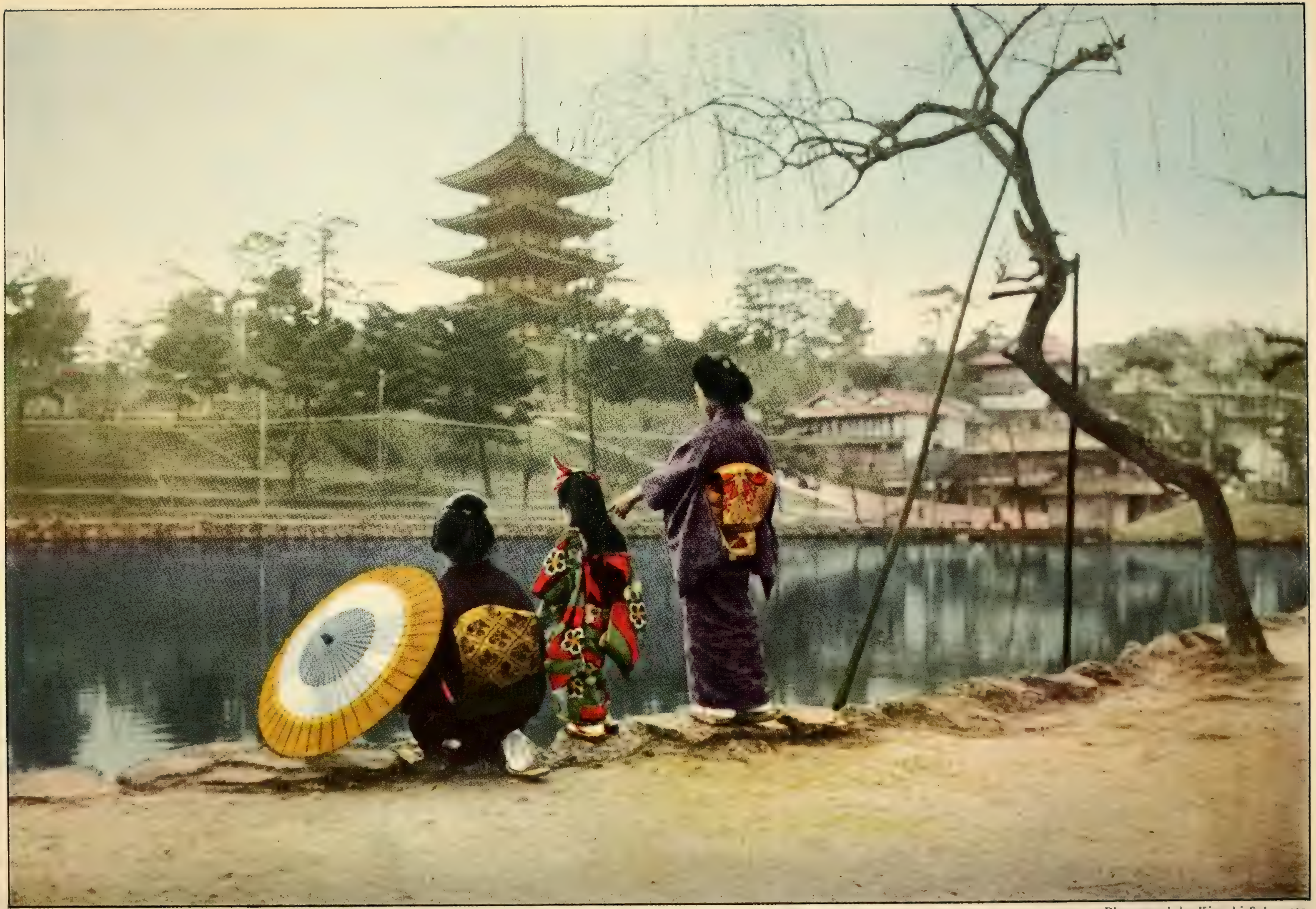
Instead of the familiar clapper or hammer of occidental bells, the Japanese employ a sound producer which resembles a battering-ram. Note the medallion cast in the bell, indicating the point at which it is supposed to be struck. The Buddhist priest is announcing the hour of service.



Photograph by Kiyoshi Sakamoto

THE HOUR FOR REFRESHMENTS

No matter where one may be at tea time in Japan, there is always a picturesque rest house near at hand. Few social ceremonies are observed with greater punctilio than the afternoon tea among the upper classes of the Island Empire.



Photograph by Kiyoshi Sakamoto

ON THE BANKS OF THE SARUSAWA-NI-IKE IN THE FAMOUS PARK OF NARA, AN ANCIENT CAPITAL OF JAPAN

This pleasure ground, known as Nara-Koen, is the largest park in Japan and is rich in classical memories. On the banks of its bijou lake, in which the carp are so plentiful that it is called " half water and half fish," is a shrine dedicated to a court lady of old who drowned herself after discovering that she no longer enjoyed the favor of her sovereign.

Of the 200 volcanoes of Japan, some fifty are more or less active. Their forms are most varied, some exhibiting a cluster of lofty, sword-like peaks or serrated ramparts converging to a common center like the spokes of a gigantic wheel.

Of the beautiful cone-shaped peaks, the unique example is, of course, the famous Fuji-san (Fuji-yama), the "Matchless Mountain." Its snow-clad form, rising in one majestic sweep from the Pacific shore to a height of 12,400 feet, is revered, admired, and loved by millions of toilers in busy cities and on wide-spread countrysides.

Its influence on the imagination is expressed in the art and the religious aspirations of the nation in every conceivable form. Its summit is sought by thousands of white-robed pilgrims every summer, who, during the two months of the climbing season, toil to the topmost of its many sacred shrines for adoration and prayer.

On one occasion I asked of the venerable leader of one of these bands of climbers the significance of the white garments. "We wear them," he said, "in token of the purity of thought and action which we desire and without which the mountain divinity will not listen to our prayers." Indeed, his reply was almost a quotation from familiar Hebrew poetry we know: "Who shall ascend into the Hill of the Lord, and who shall rise up in His Holy Place? Even he that hath clean hands and a pure heart."

JAPANESE REGARD OBJECTS OF NATURE WITH FEAR AND LOVE

It is, however, in the great Alpine ranges of central Japan that the influence of Nature upon man is most marked and most far-reaching. A day's journey from the many modernizing influences of the twentieth-century civilization of the capital constitutes a leap from the present day to a world of a thousand years ago.

Until we grasp this fact we can have only a very partial and misleading conception of the mental attitude of the majority of the Japanese people toward their physical surroundings. The reverence, admiration, and fear with which, as I have already pointed out, they regard the most striking objects of Nature are most forcefully expressed in their views regarding the great mountains.

But it is when we penetrate into the secluded fastnesses of the wild Alpine regions beyond, where scores of splendid peaks attain a height of nearly 10,000 feet or over, that the feelings inspired indicate a different mood. There fear is apt to replace love. Some personal experiences will perhaps best serve to illustrate my meaning.

WASPS AS SPIRITS OF VENGEANCE

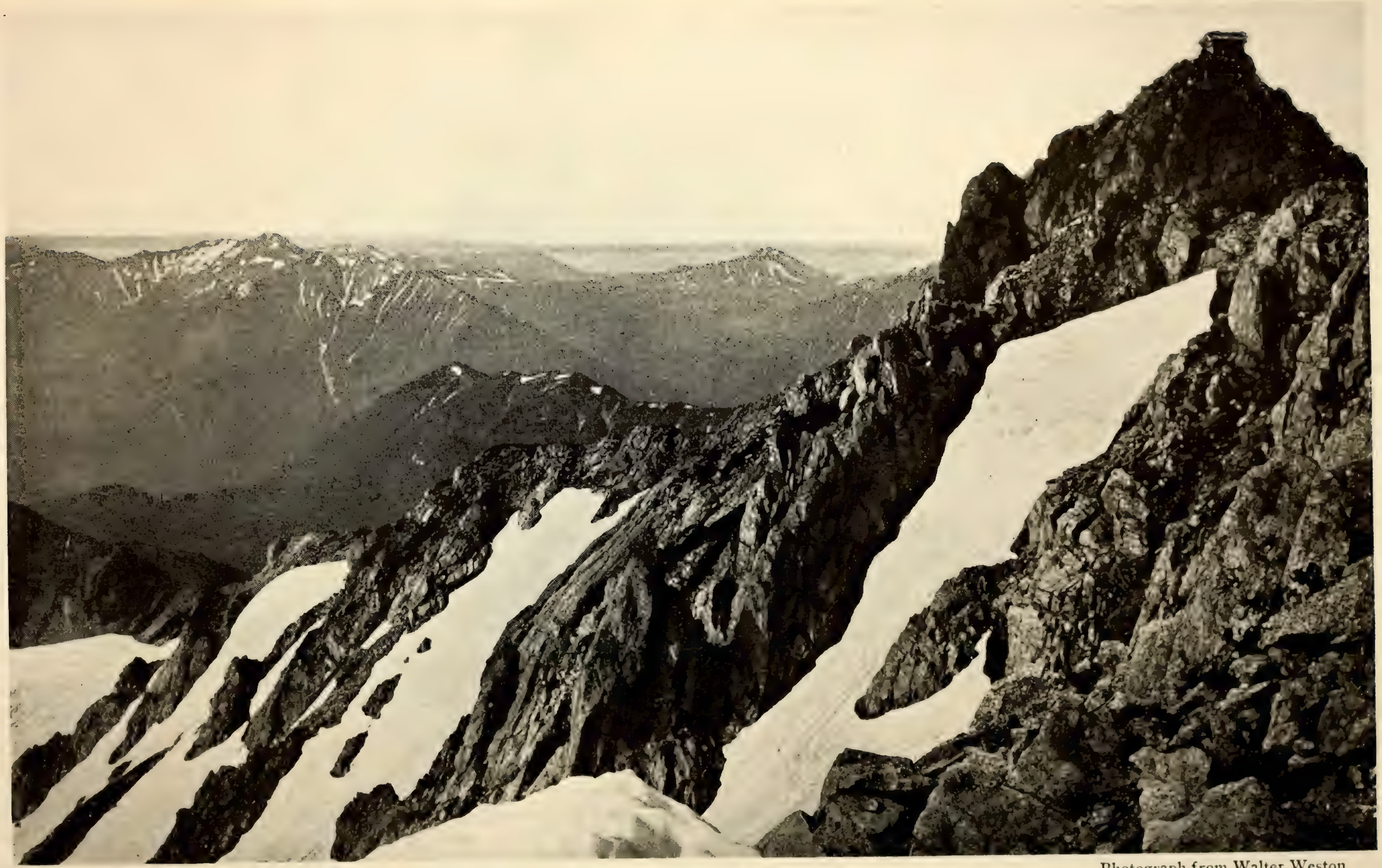
I was one day returning from the first ascent of the greatest granite peak in the northern Japanese Alps, when my hunter-guide and I were suddenly attacked and badly stung by a number of wasps on whose nest my companion, in the darkness of the forest, had unwittingly trodden.

Later on that evening, as I stood at the camp-fire, drying sodden clothes, a Japanese traveler approached with the inquiry, "Where did the wasps sting your honorable body?"

On my replying, he proceeded to squat down behind me by the camp-fire and make a series of mesmeric passes over my person. He then rose, took his stand in the doorway toward the now moonlit form of the mountain towering above, and, after clapping his hands, for a while he bowed his head in silent prayer to the Mountain God.

He then approached me with the explanation that what I had thought—and felt—to be wasps were really the embodied spirits of vengeance, sent by that divinity to punish an impious intruder who had ventured to desecrate the sacred summit with an alien hoof. He, however, possessing the power of exorcism, was able to remove the evil by its exercise.

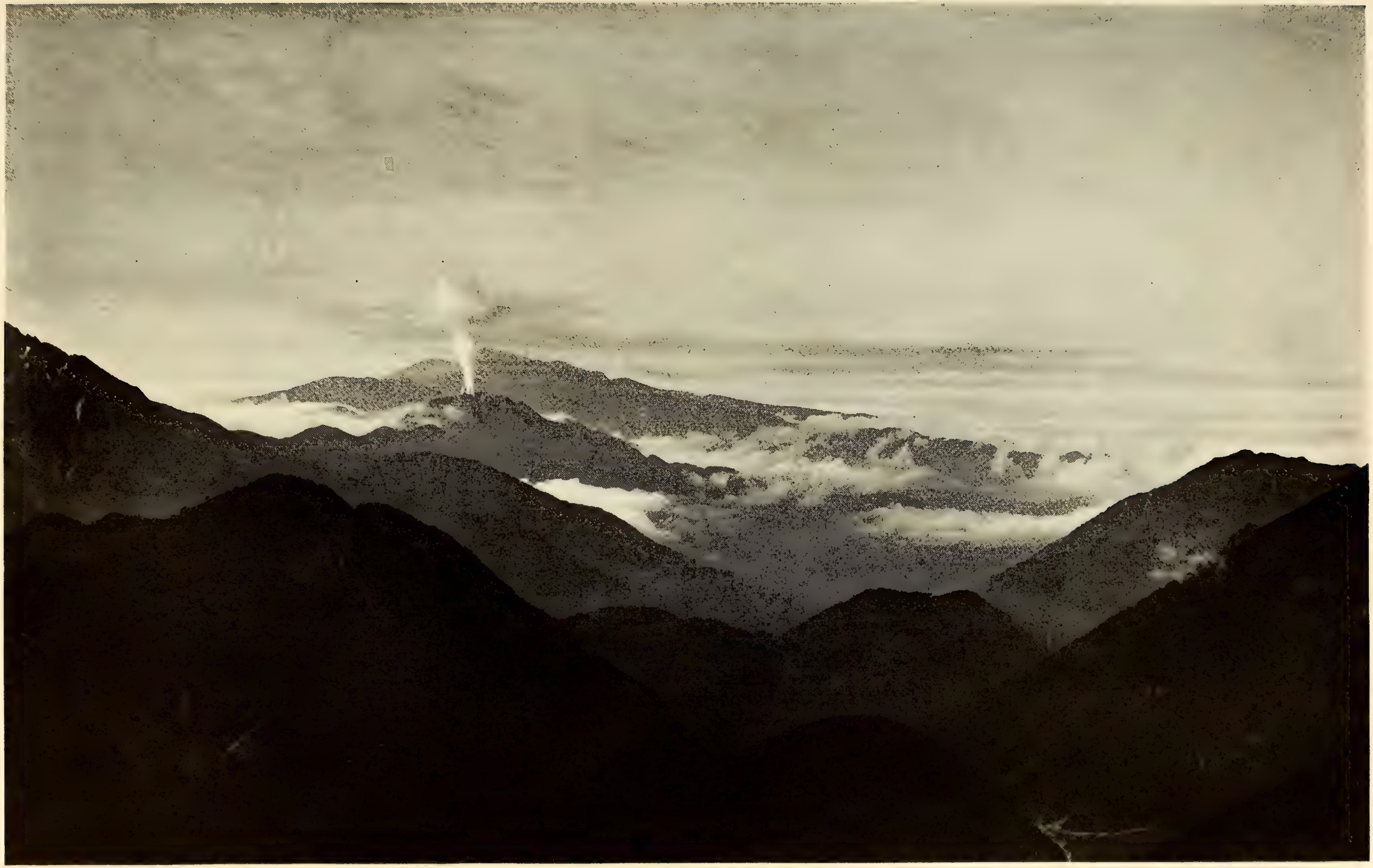
On a later occasion I was making the ascent of the pinnacle of Hō-wō-zan, another virgin peak, in the southern Japanese Alps, when my hunters stalked a fine chamois in an adjoining ravine. Meeting me later on, and carrying the carcass with them, they suddenly laid it down, scarcely lifeless, at my feet and proceeded to cut it up. The choicest portion of its interior they then respectfully offered to me to partake of, raw and



Photograph from Walter Weston

THE SUMMIT SHRINE OF TATEYAMA, IN THE NORTH JAPANESE ALPS

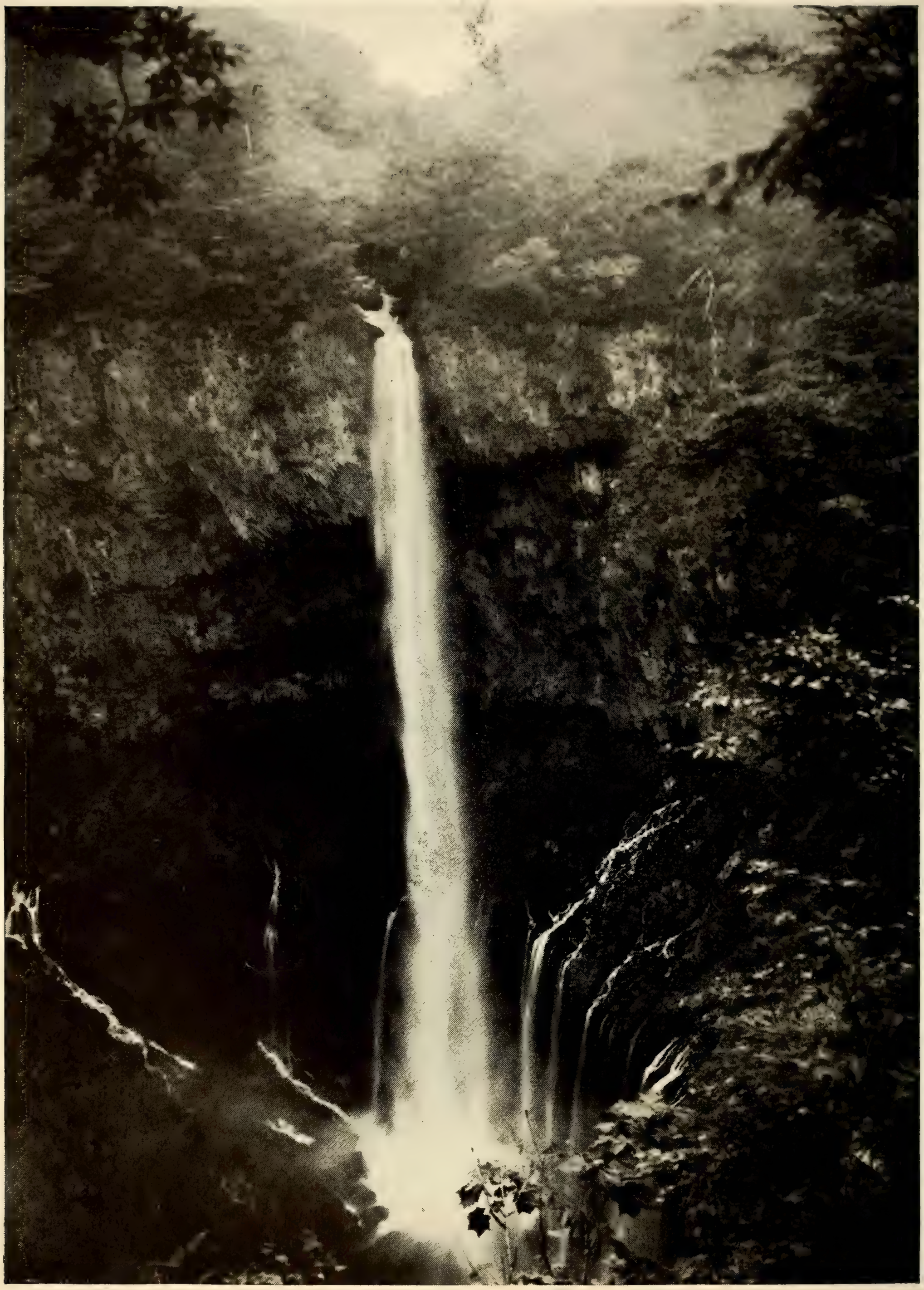
The shrine is merely a small wooden hut, but every year, from July 20 to September 10, pilgrims flock to it. Nowhere else in Japan can the traveler obtain so extensive a sweep of mountain scenery.



Photograph from Walter Weston

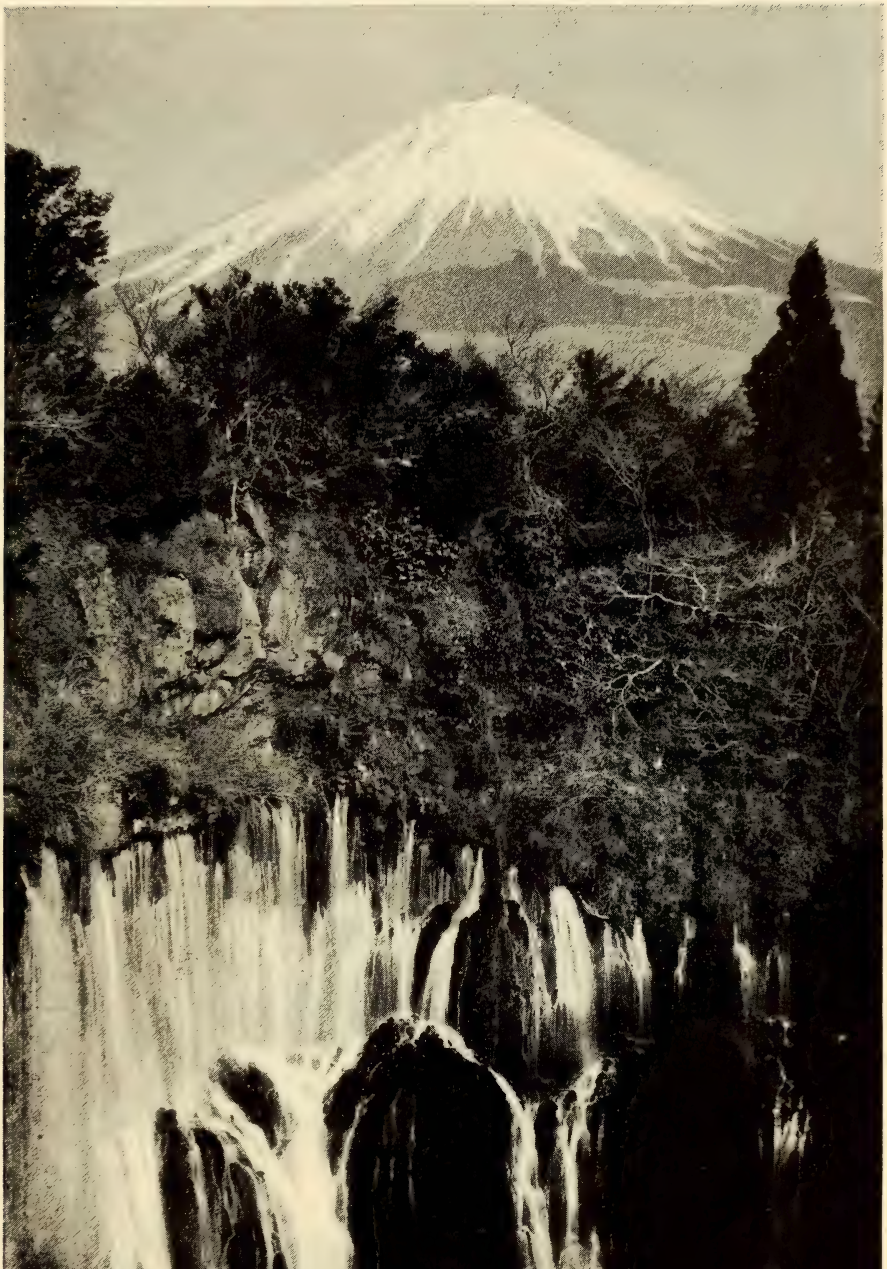
THE HIGHEST ACTIVE VOLCANO IN JAPAN, YAKE-DAKE

Yake-dake has a more famous twin, Asama-yama, near the summer resort of Karuizawa, with which apparently there is a subterranean connection. When one is active the other is resting for its own turn, which comes with mathematical regularity. The two active volcanoes are about fifty miles apart.



THE KEGON FALLS AT NIKKO, ONE OF THE CHIEF RELIGIOUS CENTERS OF JAPAN

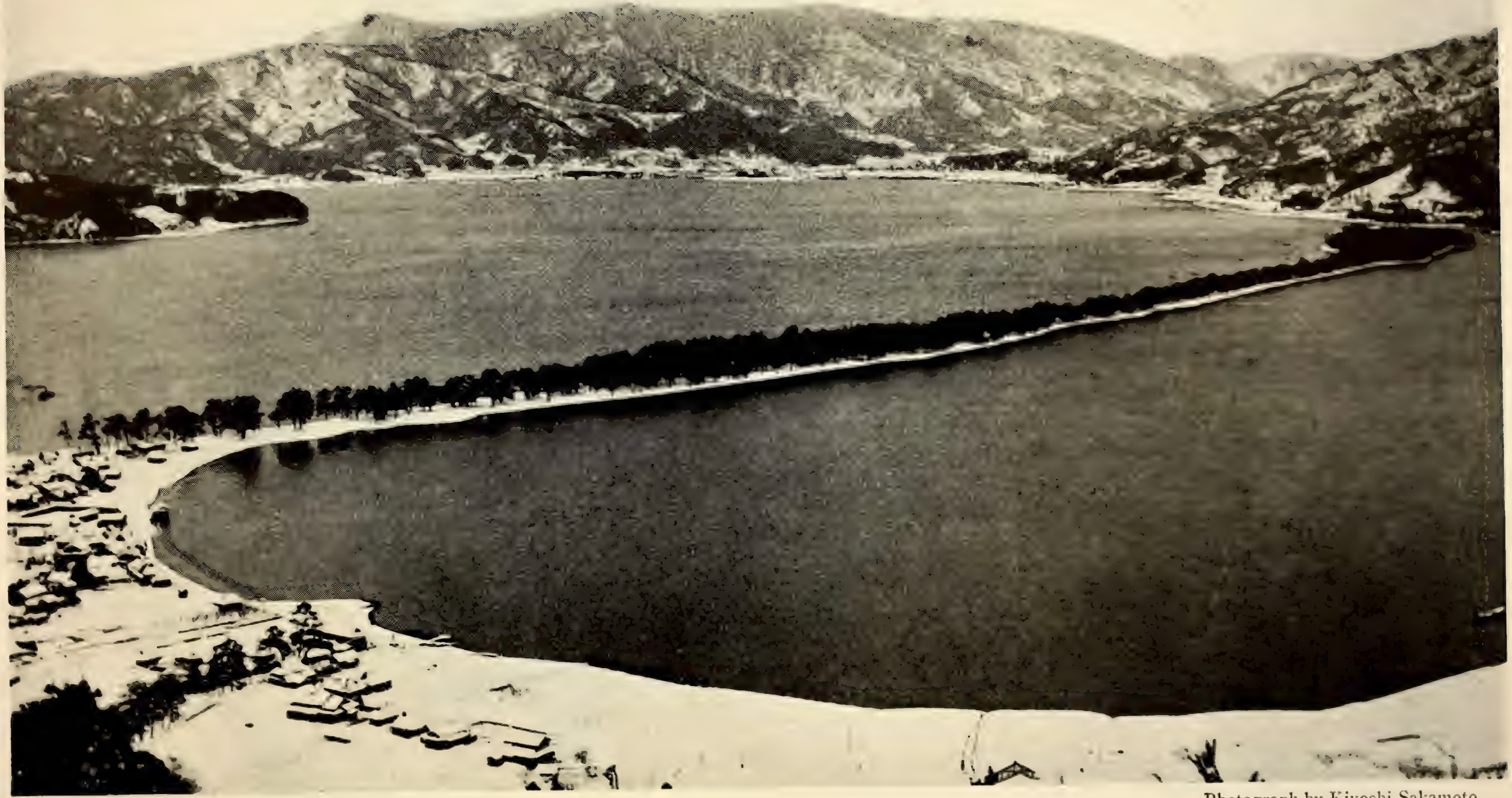
The slender ribbon of water is the outlet for Lake Chuzenji, falling 350 feet into a rocky basin. Near the basin myriad minor cascades form a lovely setting.



© Kadel and Herbert

MT. FUJI AND SHIRAITO-NO-TAKI ("WHITE-STRING WATERFALLS")

"The popular description of this lovely cataract is that the two larger and the 39 smaller falls composing it are the parents and the children of a family of 41 members."



Photograph by Kiyoshi Sakamoto

AMA-NO-HASHIDATE ("HEAVEN'S BRIDGE"), ON A SNOWY MORNING, ONE OF THE "THREE FAMOUS SIGHTS" OF JAPAN

The principal feature of this superb landscape is a pine grove on a sand-bar two miles long and 200 feet wide. Ama-no-hashidate is reached by rail, 91 miles from Osaka.

smoking, with the assurance that I should thereby acquire those attributes of the chamois most desirable in a climber—nimbleness, strength, and mountaineering skill.*

They subsequently begged me, as I had been fortunate enough to make the first ascent of the mountain, to build on the summit a shrine in honor of the Mountain God, and myself to become its first guardian priest. It always appealed to me as the strangest offer of preferment and the most singular proposal for church-building that I ever received.

A frequent cause of delay or ill-success in exploring unfamiliar peaks in these regions has been the inability to obtain the help of the hunters, who alone know the best approaches. A careful inquiry usually led to the discovery either that the men were afraid to bring an alien on the sacred mountain, lest the mountain spirits should in angry retaliation destroy their crops, or that they were absent, engaged in the rite of *Amagoi,* a service of supplication in time of drought.

This service usually consisted of lighting bonfires and discharging guns to draw the attention of the god to the fire in order that he might extinguish it by sending the needed downpour of rain.

But it is on Fuji-san itself that some of the strangest of such experiences have fallen to my lot.

CLIMBING SNOW-CLAD FUJI

Many years ago, with two Cambridge friends, then visiting Japan, I climbed the sacred mountain, snow-clad in early spring. We had been warned by the village priests and policemen that the anger of the Goddess at such an untimely intrusion (for she was not "at home" to visitors except in the depth of summertime) would surely make itself felt.

As an actual fact, we had advanced only a short distance when the weather changed, a typhoon burst upon us, and we were imprisoned for three days in our bivouac half-way up the mountain. However, after the storm came sunshine and with it a successful climb, which did not bring us back to our village friends again. Their kindly solicitude, however, soon rendered us the objects of public concern, and the "foreign" newspapers forthwith honored us with the following obituary notice, translated from a well-known Japanese journal (the *Hochi Shimbun*):

"The foreigners who started to ascend Fuji with two coolies have not since been heard of. The mountain is still covered with snow, and as the summit was hidden in clouds, the visitors were urged to postpone the attempt. But these foreigners were determined to go. A few hours afterwards the storm burst, dislodging huge boulders and house roofs.

"As nothing has since been heard of them, it is feared they have succumbed to the fury of the gale. Even had they taken shelter, cold and starvation must long since have rendered them helpless. Their nationality is unknown, but we surmise that they are British, for the reason that the people of that nation like to do that which is distasteful to them and glory in their vigor!"

TENTH CENTURY MEETS TWENTIETH ON FUJI'S SUMMIT

There is one outstanding feature of this beautiful and sacred mountain that differentiates it from any other known; for there the unromantic realism and materialism of the twentieth century stretches out its hand across a thousand years and draws the tenth century to its side with all its old-world dreams and communings.

Almost at the very door of the most sacred shrine on this holy peak the post-office banner flutters in the breeze to beckon the tired but triumphant pilgrim to dispatch to the four corners of Japan the picture postcard that shall announce his successful toil.

And as at early dawn you turn from a surprised contemplation of the most up-to-date installation of modern meteorology on the crater's edge, your astonished eyes are arrested and held with reverent interest by the sight of the shivering limbs and the adoring gaze of some aged pilgrim, whose white-clothed form enshrines the flowing devotion of a primeval worship paid in all sincerity to the splendors of the "Rising Sun."

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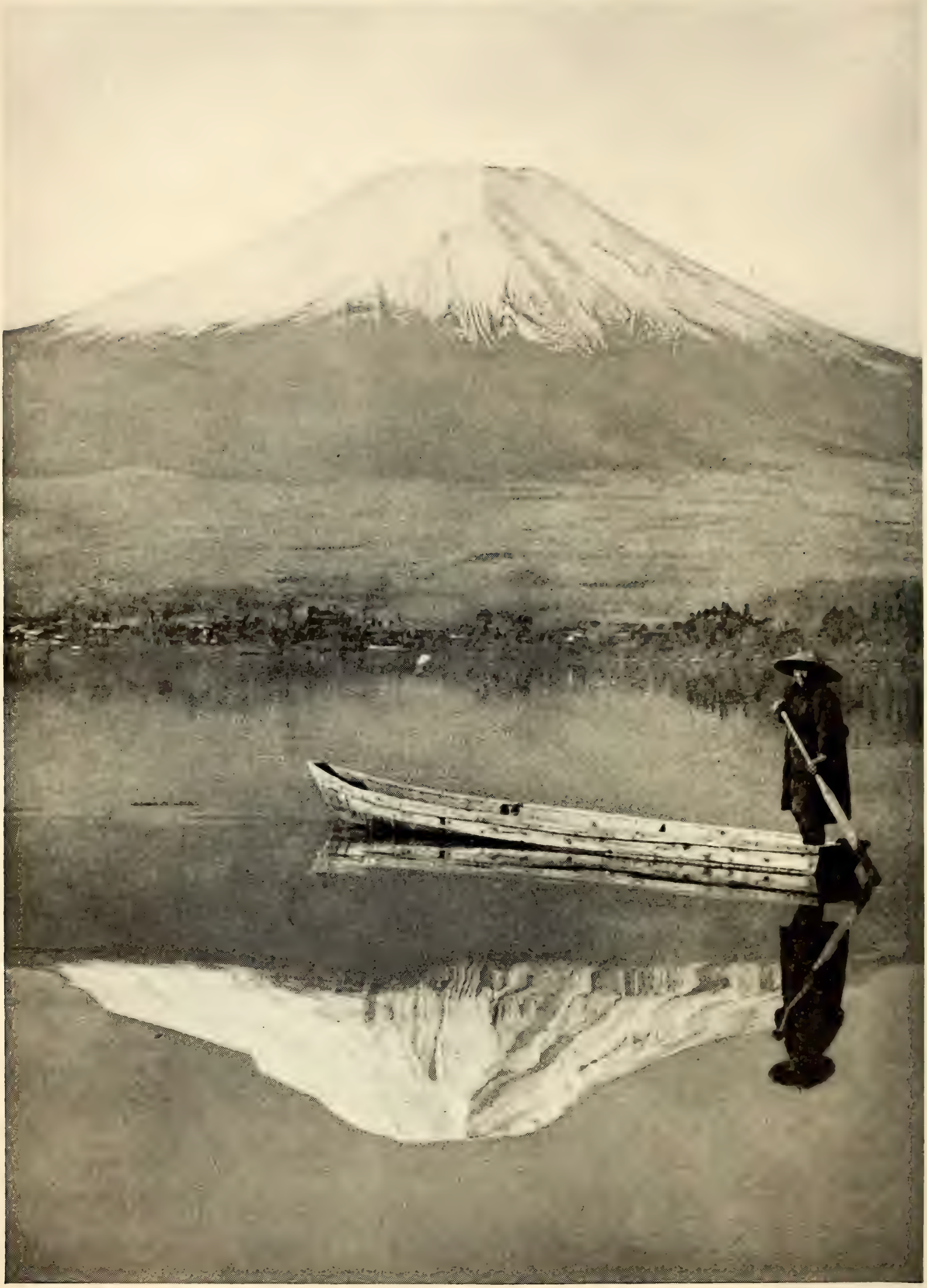
* For an account of a similar superstition among primitive Koreans, see "Exploring Unknown Corners of the Hermit Kingdom," in THE GEOGRAPHIC for July, 1914.



MT. FUJI, IN THE RÔLE OF NARCISSUS, VIEWS ITS OWN SUBLIMITY IN THE MIRROR OF LAKE SHOJI

Fuji-san, "The Matchless Mountain," is loved by millions of toilers in busy cities and on widespread countrysides (see text, page 77).

THE NATIONAL GEOGRAPHIC SOCIETY COMPLETES ITS GIFTS OF BIG TREES

THE trustees and officers of the National Geographic Society are deeply gratified to announce to members that The Society has been continuing its effort, begun in 1916, to preserve the Big Trees of Sequoia National Park.

By a final purchase in April, 1921, of 640 acres of land in Sequoia National Park, these famous trees, oldest and most massive among all living things, the only ones of their kind in the world, have been saved; they will not be cut down and converted into lumber.

Were a monument of human erection to be destroyed, it might be replaced; but had these aborigines of American forests been felled, they would have disappeared forever. The Big Trees could no more be restored than could those other survivals of indigenous American life, the red man and the buffalo, should they become extinct.

FIRST PURCHASE MADE IN 1916

Members of the National Geographic Society will recall that, in 1916, Congress had appropriated $50,000 for the purchase of certain private holdings in Sequoia National Park, but the owners declined to sell for less than $70,000. In that emergency the National Geographic Society took the first step toward saving the Big Trees by subscribing the remaining $20,000.* Thus 667 acres were purchased. The Society's equity in them was conveyed to the government, and this tract became the property, for all time, of the American people.

In 1920, inspired by the first benefaction, three members of The Society gave The Society sums equivalent to the purchase price of $21,330, necessary to acquire three more tracts, aggregating 609 acres. Thus the original area of Sequoias saved from destruction was almost doubled.

At the request of the donors, this area was presented to the government by the National Geographic Society in June, 1920. This gift was made possible by the generosity of Stephen T. Mather, Director of National Park Service, who personally contributed $13,130; by D. E. Skinner, of Seattle, who contributed $5,000; and by Louis Titus, of Washington, D. C., who contributed $3,200.

ONE HOLDING REMAINED IN PRIVATE HANDS

There still remained one other important private holding in Sequoia National Park amounting to 640 acres. Through this tract, which is covered by a splendid stand of giant sugar-pine and fir, runs the road to Giant Forest.

To acquire this approach to the unique forest and to eliminate the last of the private holdings in this natural temple, the National Geographic Society and friends of The Society, in 1921, contributed $55,000, with which the tract was purchased. On April 20, 1921, it was formally tendered in the name of The Society, through Secretary of the Interior Albert B. Fall, to the American people.

This sum of $55,000 includes $10,000 from the tax fund of Tulare County, California, within which the Sequoia National Park is situated, a practical evidence that the people closest to the park are alive to the importance of our government owning the land.

The contributors and the amounts contributed were:

Research Fund of the National Geographic Society	$5,000
W. F. Chandler, Fresno, California	6,000
George F. Eastman, Rochester, New York	15,000
William Kent, Kentfield, California	250
Stephen T. Mather, Director National Park Service	14,000
Charles W. Merrill, Berkeley, California	250
James K. Moffitt, San Francisco	500
John Barton Payne, former Secretary of Interior	2,000
Julius Rosenwald, Chicago, Illinois	1,000
Rudolph Spreckels, San Francisco	1,000
Special Tax Levy of Tulare County, California	10,000
	$55,000

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*See "Our Big Trees Saved," in the NATIONAL GEOGRAPHIC MAGAZINE for January, 1917.

Thus the National Geographic Society has conveyed to the United States Government a total acreage in Sequoia National Park of 1,916 acres, purchased at a total cost of $96,330.

EVERY MEMBER HAS A PART IN GIFT

It should be noted that the gifts were not solicited by The Society. The National Geographic Society asks its membership for no contributions of any sort. Its publications and its scientific and educational activities are entirely supported by their dues.

Every member of The Society may feel that he had a part in this enduring gift to his country and to posterity, for the funds appropriated directly by The Society for the purchase of the Sequoias came from the fraction of the dues of members set aside for such benefactions.

The tender was made in the name of the National Geographic Society because, as the Director of the National Park Service, Mr. Mather, put it: "It is only proper that this gift should come to the government through the National Geographic Society, in view of the keen interest which The Society has taken in the purchase of the other private holdings in this park. It was through direct gifts by your Society that we were able to save the Giant Forest, which contains the finest stand of *Sequoia Washingtoniana* in the Sierra."

SECRETARY FALL ACKNOWLEDGES GIFT

Following the presentation, Albert B. Fall, Secretary of the Interior, wrote to Gilbert Grosvenor, President of the National Geographic Society:

DEAR MR. GROSVENOR:

It was a very pleasant surprise when you called on me on April 20 and, on behalf of the National Geographic Society, presented the title deeds and other pertinent papers conveying to the United States the so-called Martin tract of 640 acres in the Sequoia National Park, recently purchased at a cost of $55,000 by your Society, through the generosity of its members, in order that this area with its fine stand of trees might be preserved for the American people.

I have already personally expressed to you my sincere thanks and my acceptance of the proffered gift. Your Society on several preceding occasions has stepped in at a crucial moment and acquired several similar areas in this same park, thereby saving from extermination other wonderful trees that would otherwise have fallen under the axe.

Your Society is to be highly commended on its substantial expression of a high public spirit, and on behalf of the United States I again want to express to you, and through you to the contributors, my deepest appreciation of your generous and considerate action.

Respectfully,
ALBERT B. FALL.

Mr. Gilbert Grosvenor,
President, National Geographic Society,
Washington, D. C.

To mankind, throughout the ages, trees have been the most human-like, the most companionable, of all inanimate things. Aristotle thought they must have perceptions and passions. An infinitely more scientific generation still is sensible to their mystical power.

More and more will Americans visit Sequoia National Park to gaze upon the majesty of "Nature's forest masterpieces" in their last stand. National Geographic Society members may well be proud that they had a part in preserving for all time these mementoes of a past far beyond the records of written history.

INDEX FOR JANUARY-JUNE, 1921, VOLUME READY

Index for Volume XXXIX (January-June, 1921) will be mailed to members upon request.

ADVENTURES WITH A CAMERA IN MANY LANDS

BY MAYNARD OWEN WILLIAMS

AUTHOR OF "RUSSIA'S ORPHAN RACES," "THE DESCENDANTS OF CONFUCIUS," "SYRIA, THE LAND LINK OF HISTORY'S CHAIN," AND "CZECHOSLOVAKIA, KEY-LAND TO CENTRAL EUROPE"

With Illustrations from Photographs by the Author

The author of the following article has recently returned to America after a year's tour of Europe and Asia as a staff observer for the NATIONAL GEOGRAPHIC MAGAZINE. *In addition to the countries of western and central Europe, Mr. Williams visited Egypt, Palestine, Ceylon, southern, central, and northern India, Baluchistan, and Burma.*

THE snap-shot photograph is the magic carpet which adds a fairy-tale touch to a routine world. It satisfies man's desire to extend his horizon, to reach out into the unknown, and to identify himself a little more closely with the world of which he is a part.

Photographing the common people of foreign lands is a fascinating pastime. No fisher is forced to use more patience than the man who seeks through photography to show the folks at home how the other half of the world actually lives. No hunter can boast of so satisfactory a bag as falls to him who hunts with the clairvoyant eye of the camera. The focusing knob of a graflex is a more thrilling bit of mechanism than the trigger of a rifle.

THE PHOTOGRAPH IS A BASIS FOR FRIENDLY UNDERSTANDING

But photographing the world is not frivolous, nor is it merely good sport. If people and places are worth writing about, they are worth picturing. Such work is a step in the visualizing of our distant neighbors and the introduction of strangers to those who know no more about them than the camera tells. All the world is watching how the rest of the world lives.

It is habitual to speak of "the mask-like features of the Chinese." Unquestionably, when a Chinese wishes to conceal his emotions, the Sphinx looks vivacious in comparison, but when a casual observer insists that the people of China never smile or laugh, a few photographs reveal such an error of generalization.

The Chinese is unusually clever in disguising his feelings when he wants to disguise them; but a frank show of friendship and a readiness to smile in spite of toil, cold, or hunger are among the most prominent of Chinese characteristics (see pages 89 and 90).

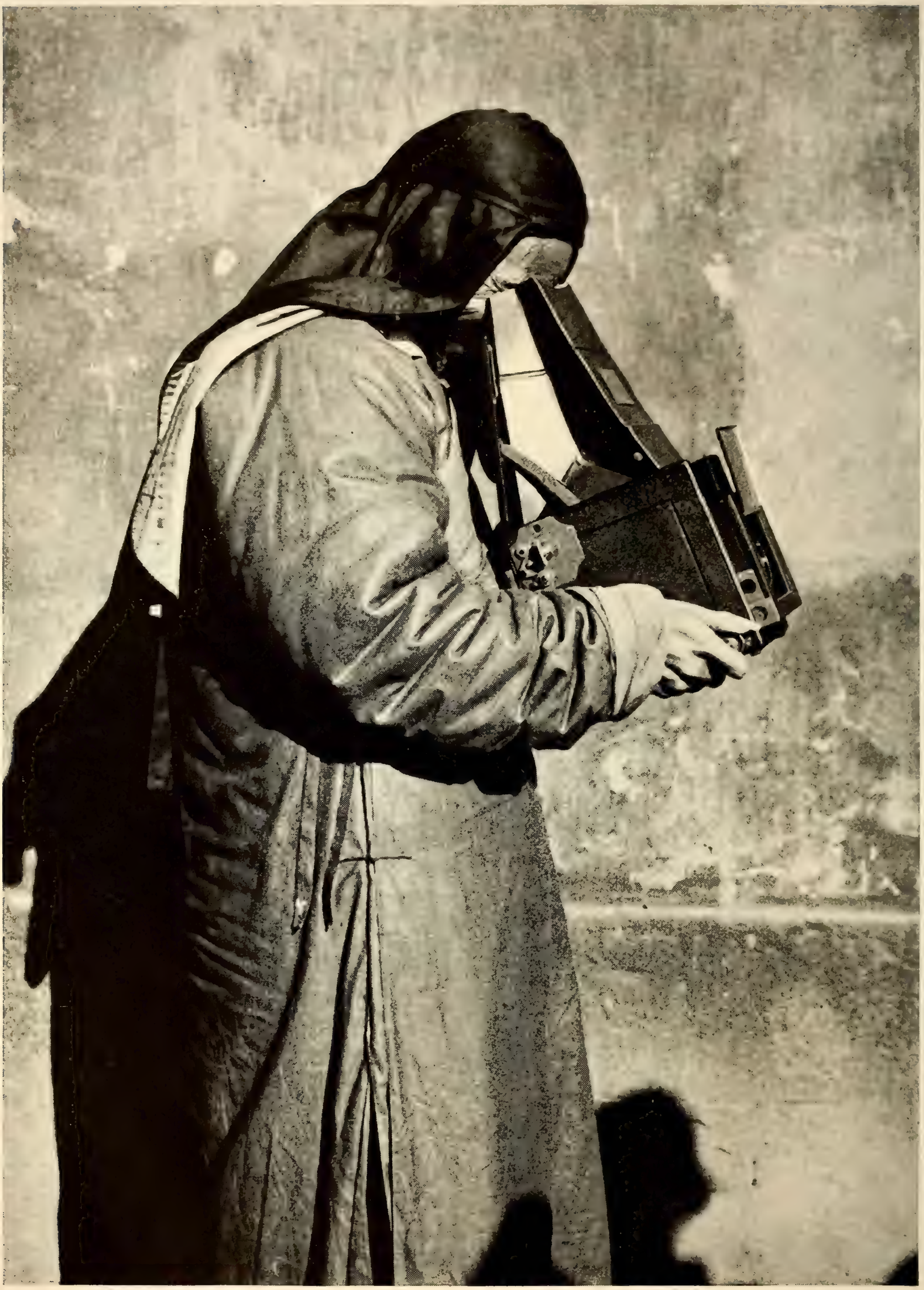
When members of a family are separated, they exchange photographs. The same method is applicable to the building up of international relations. Photography, with all its faults, is a social art. It furnishes a basis for friendly understanding.

About once a year we of the Occident hear of little glass or metal bracelets, such as the girl babies of India wear, being found in the stomachs of slaughtered crocodiles. At times I wish that some one would vary the tale by making the reclaimed property a shirt-stud or a collar-button. But when the camera is called in to report on the inhumanity of distant and little-understood peoples it is quite as likely to reveal proud mothers in India as in Indianapolis.

The camera enthusiast often has the same sort of an alibi as the fisherman. The ones that get away are always the best. Nor is this unnatural. Taking pictures requires concentration, and such diversion as a charming subject offers may drive all thought of formulæ from the amateur photographer's head.

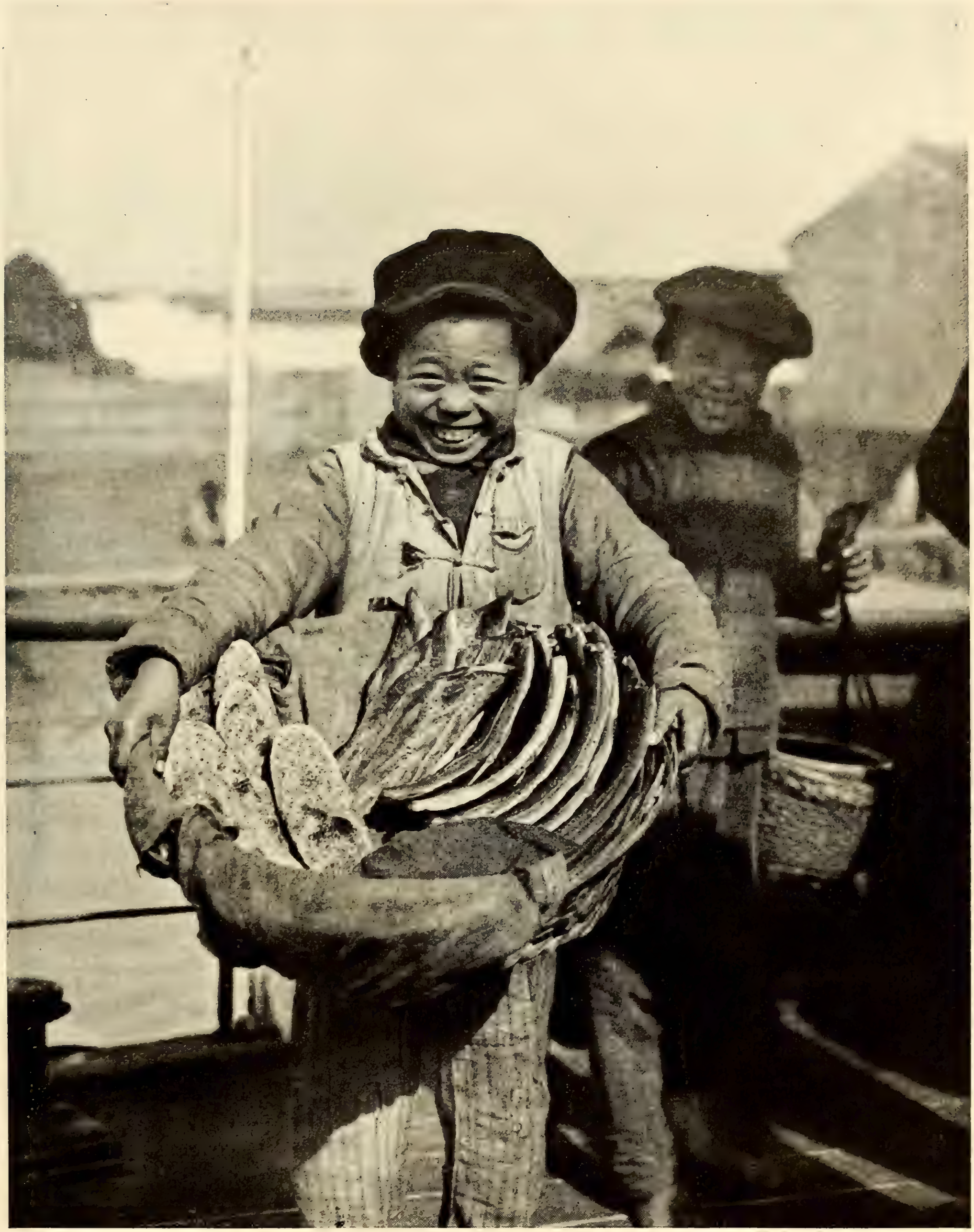
A QUEEN OF THE HOLY LAND

Coming up through Palestine some years ago I was traveling with an enthusiast who had read somewhere that the



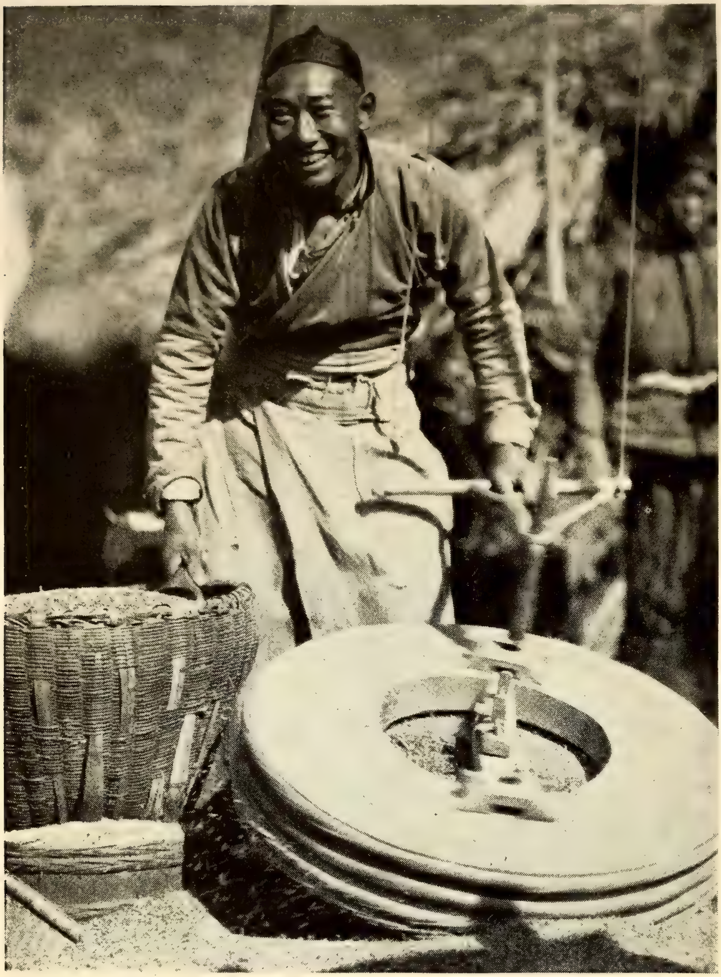
A PRIEST OF PU-TO SEES HOW IT WORKS

The lovely island of Pu-to, or Pootoo, one of the Chusan group, is one of the three most famous sites of Chinese Buddhism. Two thousand or more monks live here. At first they resented being photographed, but after looking through the camera themselves they were delighted to pose for the camera man.



"THE FACE WITH THE SMILE WINS"

A young bread-seller on a small steamer running between Ningpo and the sacred island of Pu-to (see illustration on the opposite page). "A frank show of friendship and a readiness to smile, in spite of toil, cold, or hunger, are among the most prominent of Chinese characteristics" (see page 87). Chinese bread is usually in a form which can be baked quickly and with the minimum of fuel. Poppy and sesame seeds are often used to decorate and flavor the hard loaves. Millions of Chinese do not know the taste of rice, as it grows only in well-watered tracts and the cost of transportation in a country that lacks railways makes the price of the grain prohibitive in the dry areas in the northern provinces. Poor as the Chinese are, one is seldom far from some vendor of food, whether it be bread, roast chicken or duck, or watermelon seeds, which take the place of peanuts as a Chinese luxury.



MAKING A HOLIDAY OF RICE-HULLING

The ability of the Chinese to work long hours with little food is well known, but no less remarkable is their ability to smile from morning to night, in spite of troubles which would worry less philosophical souls. Although this Chinese worker has looked up from his task to register a smile, he has not lost one revolution of his rice-huller. The lower wheel is fixed and the upper, mounted on a rude wooden axle, is turned by a raised rod. Two small ropes suspended from a joist above the wooden "millstones" help to steady the crank.

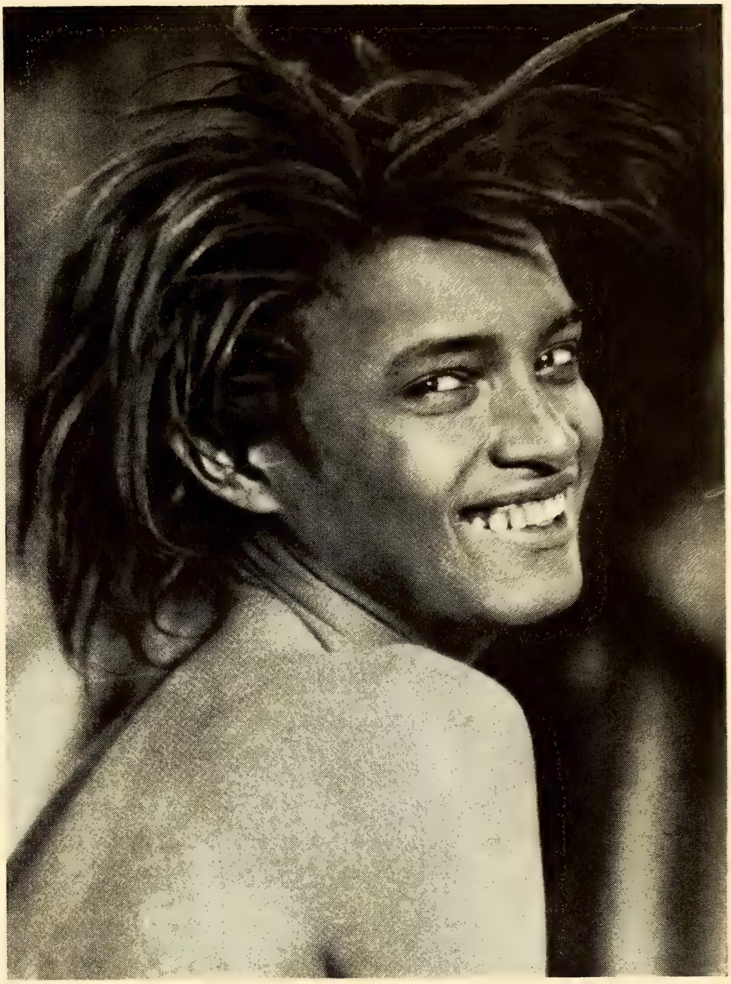
habit of carrying heavy jars of water on their heads gave to the women of the Holy Land a queenly carriage. At one of the roadside springs we halted, and after he had looked over a score or so of water-girl candidates for queenly honors, he was the most disappointed man imaginable. Then the cry of "All aboard!" rang out and the party was about to continue the ride to Samaria.

Around a curve of the road there glided a young woman who fitted perfectly the mental picture of my friend. Her raven hair was neatly parted on as fair a forehead as ever carried jet black brows above soft brown eyes. Her oval face was satiny olive, with a flush of red in the cheeks; her teeth were pearls; her nose was finely molded; but the memorable feature was that she really had the form and carriage of an uncrowned queen.

My companion made a grab for his camera, commandeered my slight knowledge of Arabic, and started off in the direction of his vision in a way that would have frightened a less capable woman. She consented to let us snap our cameras at her, and we dashed back to the carriage. A mile farther on, my friend gave a cry of chagrin. He had forgotten to withdraw the dark slide from his camera. I had not shared his enthusiasm to such a disastrous extent, with the result that a picture of our fair model appeared in THE GEOGRAPHIC several months ago.

One of the vexing problems for the photographer is the matter of tips ("backsheesh"). My own rule is never to offer or give tips to those who let me take their photographs unless they are professional beggars, hardened in their vice. The tourist centers of the world have been spoiled by those who have distributed extravagant largesse in return for photographic rights. One can be given privileges that he cannot buy.

You can't ride a high horse or a motor car and get familiar close-ups of common folks. The people of the East are suspicious of those camera hunters who stalk their game from the cushions of an automobile.



A RELIGIOUS NOVICE IN A FRIENDLY MOOD

Under the shade of a tree in the Rawalpindi bazaar, this young Hindu neophyte turned from the silent contemplation of his naked leader, smeared with ashes, to smile into the camera (see p. 97).

CAMERA HUNTING IN BALUCHISTAN

From Quetta to Sibi, in Baluchistan, I rode on the cowcatcher of a locomotive over one of the weirdest scenic routes in the world. A luxurious seat, upholstered in leather, had been placed on the front of the engine for my use, and the station masters whom I encountered were not sure but what I owned the line.

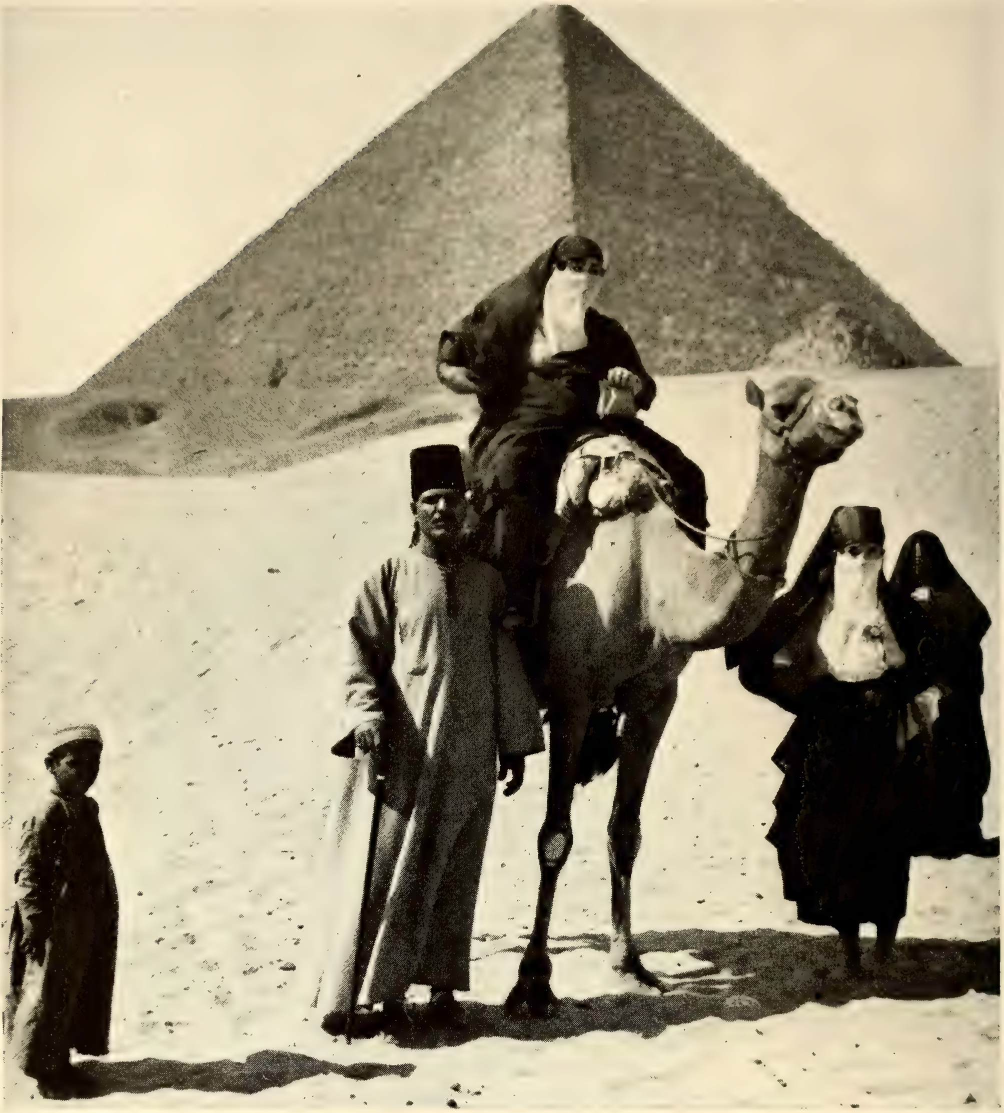
At one station I noticed a charming little girl, wearing a lemon-colored scarf with that grace which western women seldom attain, because their drapery is arranged by their dressmakers and not by themselves. But that lovely Hindu child up there in the bleak regions of Baluchistan was afraid of the black box and its Polyphemus eye.

The station master knew that if I had a private lounge attached to the engine I must be a Lieutenant-Governor or a General at least, and he feared that if his daughter balked he might be subjected to censure. He explained and pleaded, but in vain. He even dragged her toward the camera.

BUYING A SMILE WITH A TIN BOX

Now, the first rule of the photographer should be the Golden Rule; and, in any case, I had no desire to picture that lovely child in tears. I gave her the tin container from which a reel of film had been taken. She smiled. I gave her some of the chocolate almonds which constituted my lunch. Again she smiled her thanks. She had no dislike for me personally, but she would not let me point the camera at her, for she feared that it might be loaded, even if I didn't know it.

Then I let her look in at the top and showed her the locomotive and the barren hills and the long-haired Baluchis, with their spinster curls, and the smiling face of her father. If she had been a movie queen, drawing $100 a smile and $1,000 a tear, she could not have been more



VEILED WOMEN MODELS IN A WORLD-FAMOUS STUDIO

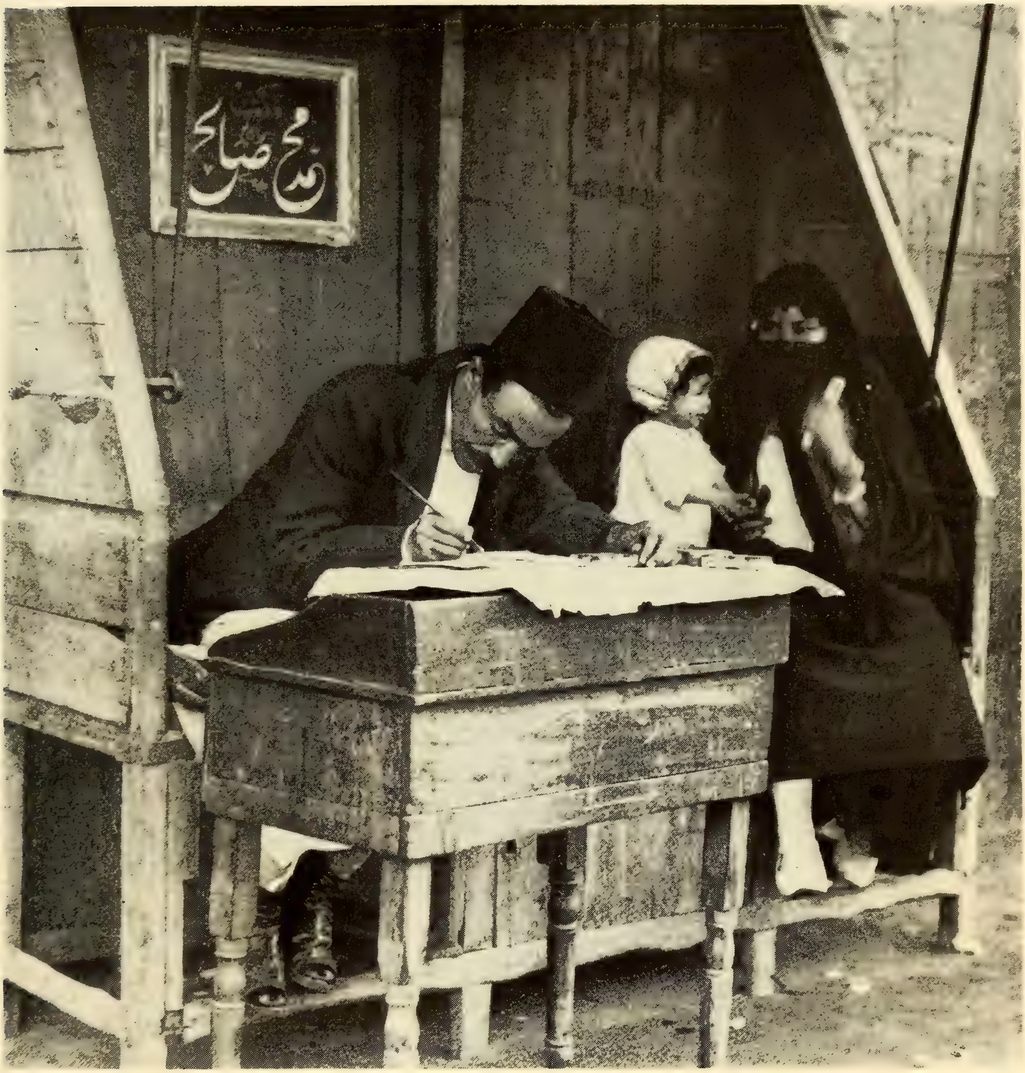
It is "the thing" for foreign visitors to have their portraits taken beside the Sphinx; but few are the veiled women who have consented to being photographed there. Women are, however, becoming more independent, even in the morning lands of history (see text, page 101).

magnanimous in letting me photograph her after that.

"I PRESS THE BUTTON; YOU DO THE REST"

Time and again I have had to show illiterate people what the mysterious black box really is. One man with whom I traveled suggested that the unwashed people who formed in line to look through my graflex would probably breathe a million different kinds of disease germs into the hood of the machine, and he pictured the possibility of my contracting pink eye, diphtheria, and other dread diseases as the result of my experiment.

But one can't get friendship without giving it, and a portrait is not a mechanical thing, but a collaboration between subject and photographer. "I press the button, but you do the rest" is one of the slogans to be kept in mind when taking



A SCRIBE OF CAIRO COMPILING THE DAY'S GOSSIP

Humbly housed in a tiny stall, which looks like the deserted home of an upright piano, the Egyptian letter-writer plies his trade. Not only all the intrigues of the mystic East are poured into his ear and flow from his fingers, but he conducts such normal business as that of which any grammar-school child would be capable.

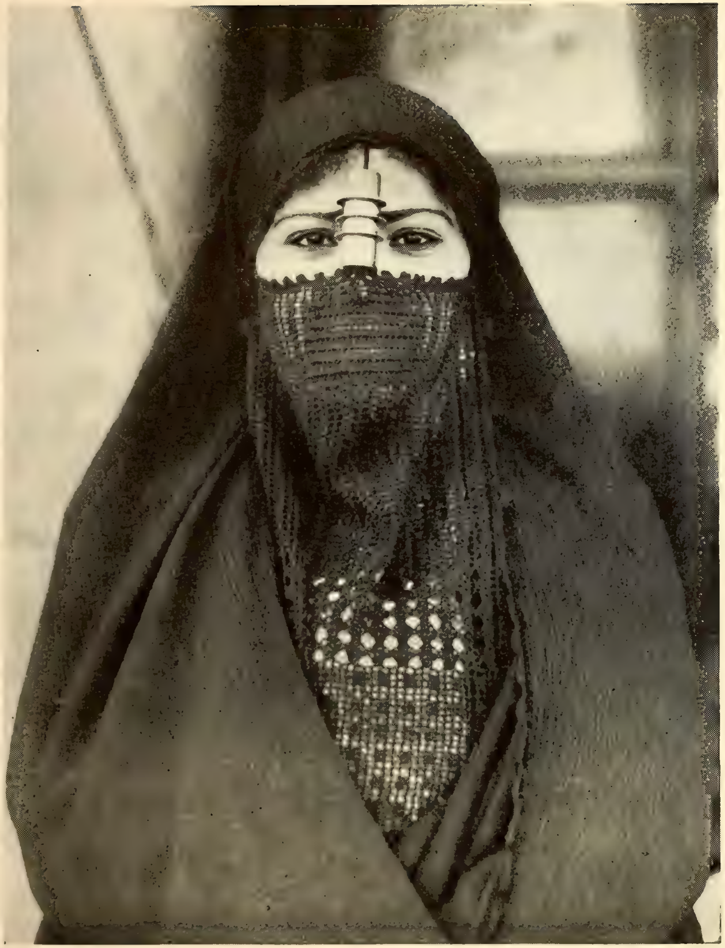
pictures of Asiatic peoples, upon whose good will the recorder of pictorial geography must rely.

It is this coöperation with those common folks who cannot speak his language which robs many a photographer's day of loneliness and makes the picturing of foreign peoples a delight such as the lion-hunter never knows. I have never seen a smile on the face of the tiger which has fallen before the rifle of a sportsman, but I have captured many a very friendly smile with my camera.

These smiles of brotherhood flashed half way around the world are the symbols of mutual confidence and understanding.

IN THE RAWALPINDI BAZAAR

The Rawalpindi bazaar, by all the conventions of guide-book emphasis, is a place of no importance at all. In the midst of the busy street, a crude rolling-mill turned by hand transformed sugar-cane from ambrosia to nectar. Sitting on a pile of a thousand suits of cast-off

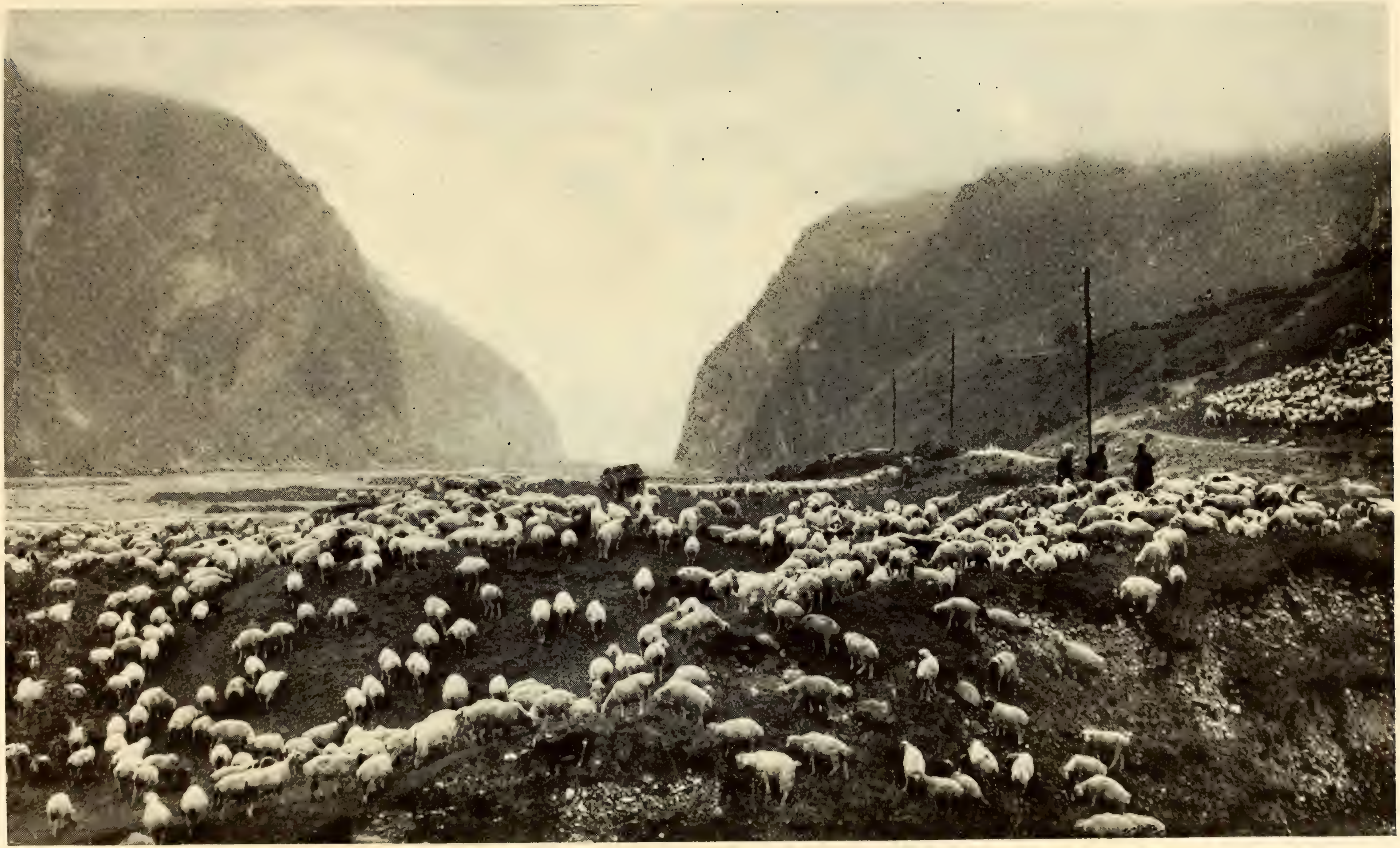


A MOSLEM WOMAN OF CAIRO WEARING THE BLACK BURKO, OR VEIL

In spite of radical changes following the war, many of the respectable women of Egypt still cling to the veil. The white gauze veil usually worn by Turkish women is often seen, but the heavy black veil and the ringed golden spool worn between the eyes are still preferred by most Egyptian women.

READING A PROCLAMATION UNDER THE NEW RÉGIME IN JERUSALEM

Dressed in long gaberdines and wearing plush caps edged with shiny fur, the Jewish population of Jerusalem can now read proclamations in their native tongue, send telegrams on blanks printed in Hebrew, and read Hebrew newspapers only recently born.



THE GATE TO ASIA ALONG A HISTORIC ROAD

Through this gorge in the Caucasus Mountain the Terek River has marked the route for countless hordes who have passed these portals on their way to or from Asia. The large flocks which go high up the mountain slopes in summer are here seen in October, making their way to the rich plains of the North Caucasus.

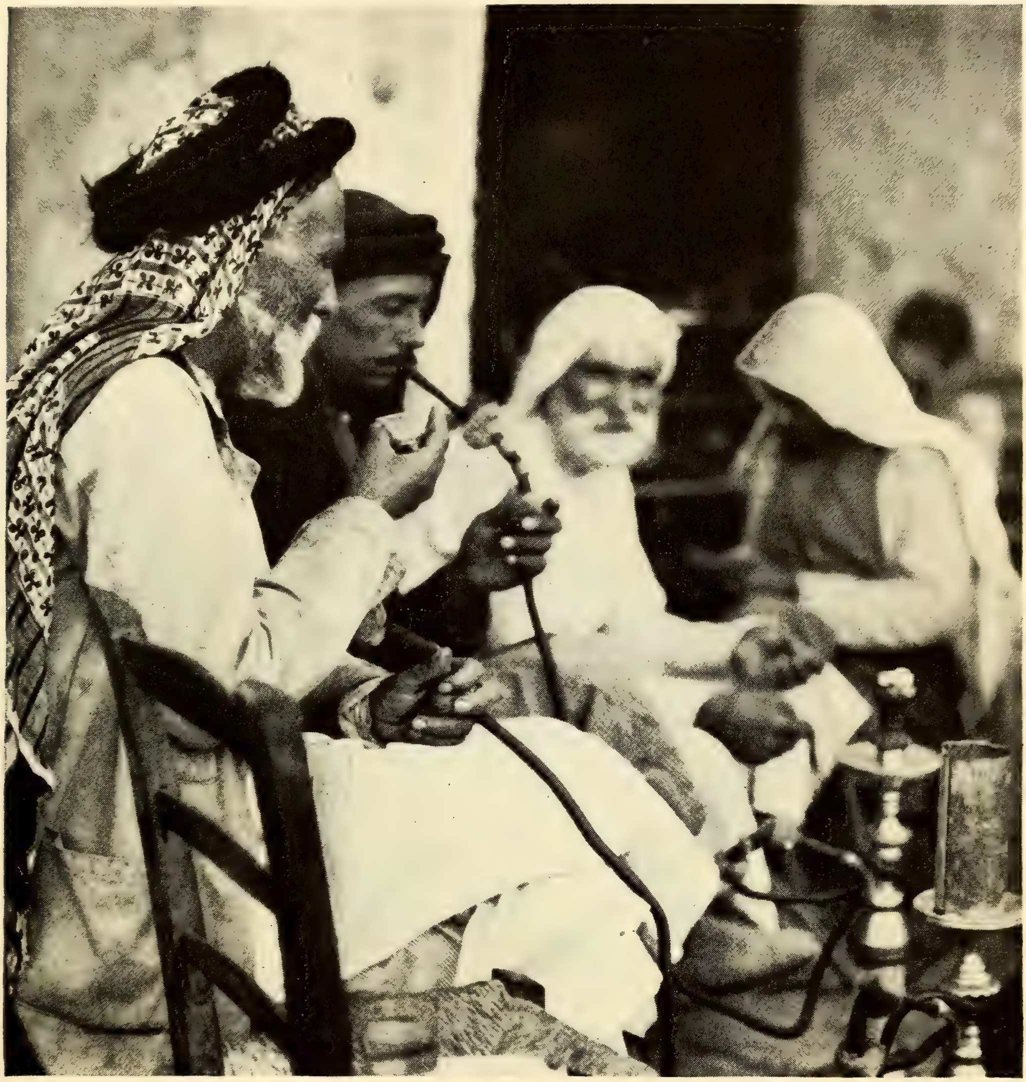
PRACTICING CONCENTRATION WITH THE AID OF MIRROR AND TWEEZERS

The capacity of the Indian for deep concentration has long been recognized. But a mirror and a pair of tweezers can sometimes lead to greater concentration than is usually given to the fourth dimension or the Einstein theory. In Rawalpindi, as in America, the barber is the beauty expert for masculine faces, but there are some things so important that a man prefers to do them himself. So engrossed was this individual in his toilet that he never saw the photographer.

army clothing, the city Solomon Levi figured up his losses on the last sale. Fruit venders had their luscious stock displayed in golden pyramids or ruddy cones touched here and there with bits of tinfoil light. Cattle strolled about at will, and, sitting beside the dusty road, a solemn personage gave such close attention to his chin that he neither saw my camera nor heard it click.

Under a tree whose dense shade lay like a tangible thing in the thoroughfare, two holy men sat beside a smokeless fire which cast a sheen on their naked chests, although beyond the boundary of their leafy shade the sunlight was intense. Around them sat several novices, bright-eyed lads who had not yet attained that air of detachment which characterized their leaders.

One of the novices had an enormous shock of hair, which looked like a gro-



A CORNER OF THE SMOKING-ROOM OF A MEN'S CLUB AT HAIFA

When and if Haifa becomes the main port of Palestine, more modern accommodations may be furnished the visitors in bright head-shawls who visit the port at the foot of Mount Carmel; but no modern improvements can better the Levantine open-air cafés, where thick Turkish coffee and snaky-tubed *nargilehs,* mixed with a liberal supply of gossip, serve to pass many a pleasant hour.

tesque wig. His face was most expressive. As his eyes and teeth flashed out from the dense shadow, the gamut of passions was reflected on his features.

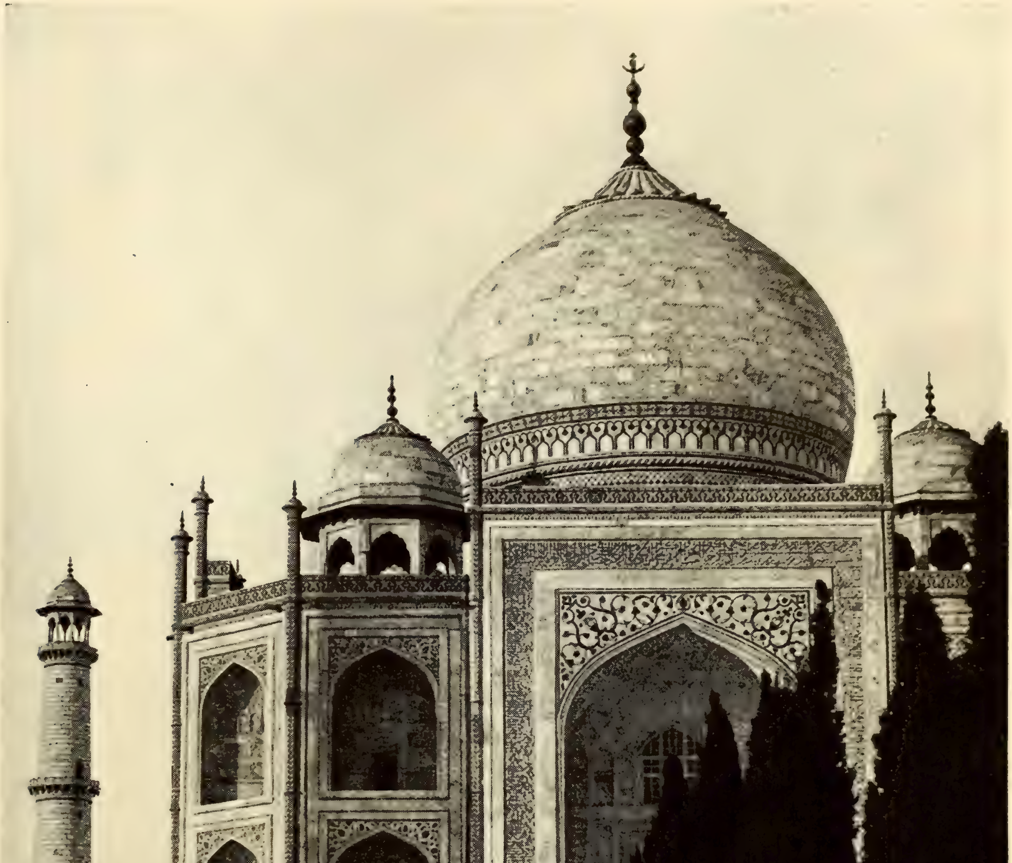
Here was a boy whose life no one of us could understand, across whose features human emotions played with vivid force. As he smiled over his bare brown shoulder, I snapped the camera. Then he turned back to the contemplation of the smokeless fire and the naked religious leader to whom he had attached himself. I returned to the table d'hôte dinner at the English hotel. But for a moment we had smiled into each other's eyes and for a moment we had understood.

GETTING PICTURES OF MOSLEM WOMEN IN EGYPT

It is harder to get a man to pose for a photograph than it is to get a woman's picture. On the other hand, one can take a man's picture without asking permission and run little risk of causing trouble,

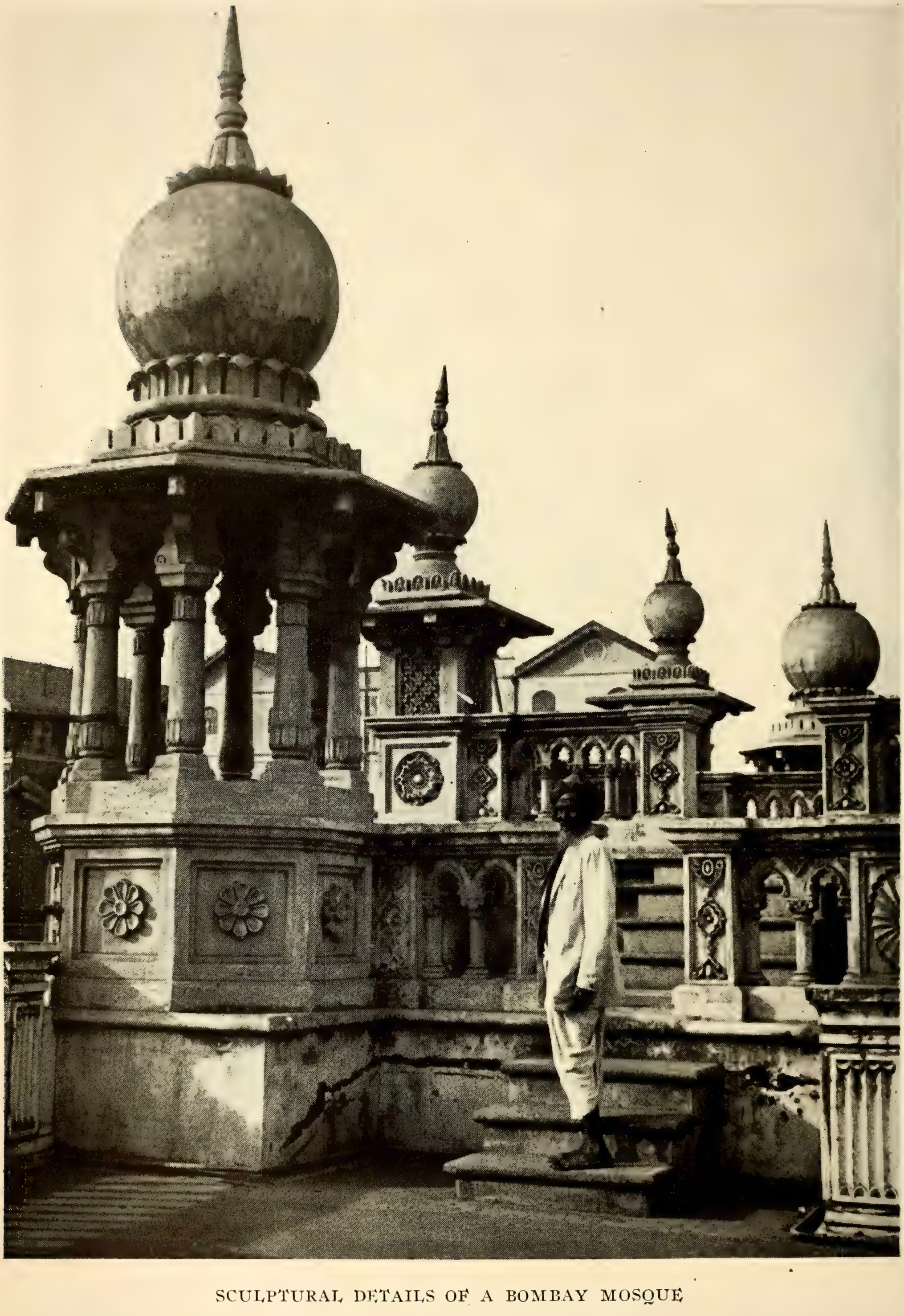
KEEPING GREEN THE SETTING OF "THE CROWN LADY'S TOMB"

The beauty of the Taj Mahal is unchanging, but the emerald setting is continually being renewed. Trees become so large that they shut off a view of the gem of all buildings and have to be removed. The "dream in marble" also gains much of its charm from the opalescent tints which touch the murky waters of the Jumna at sunset time.



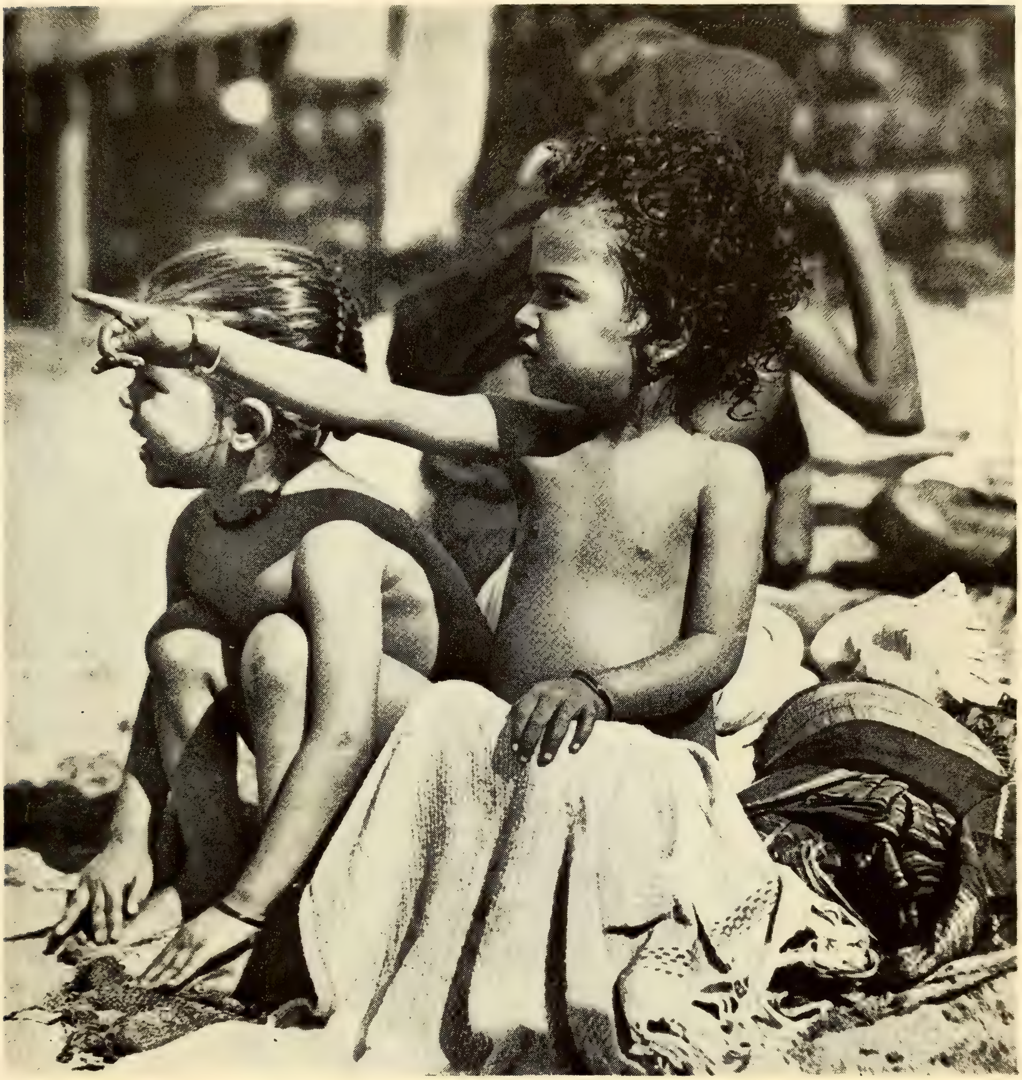
A HUMBLE SERVANT AT THE TAJ

Not every visitor to Asia's loveliest building realizes how much of its beauty depends upon the perfect care taken of the gardens, which form a splendid setting for the mausoleum in which Shah Jahan and his beloved Mumtaz i Mahal lie buried. The monument is the more remarkable in that it stands in a land where polygamy is common and where women do the most menial labor.



SCULPTURAL DETAILS OF A BOMBAY MOSQUE

With tungsten filament lights in the mihrab, or prayer niche, with electric fans plentifully supplied, with clean matting on the floor and a clock to prevent religious fervor from wearing out patience, this Bombay mosque is well equipped to make a strong bid for favor.



TWO YOUNG BOMBATHERS ON THE BEACH

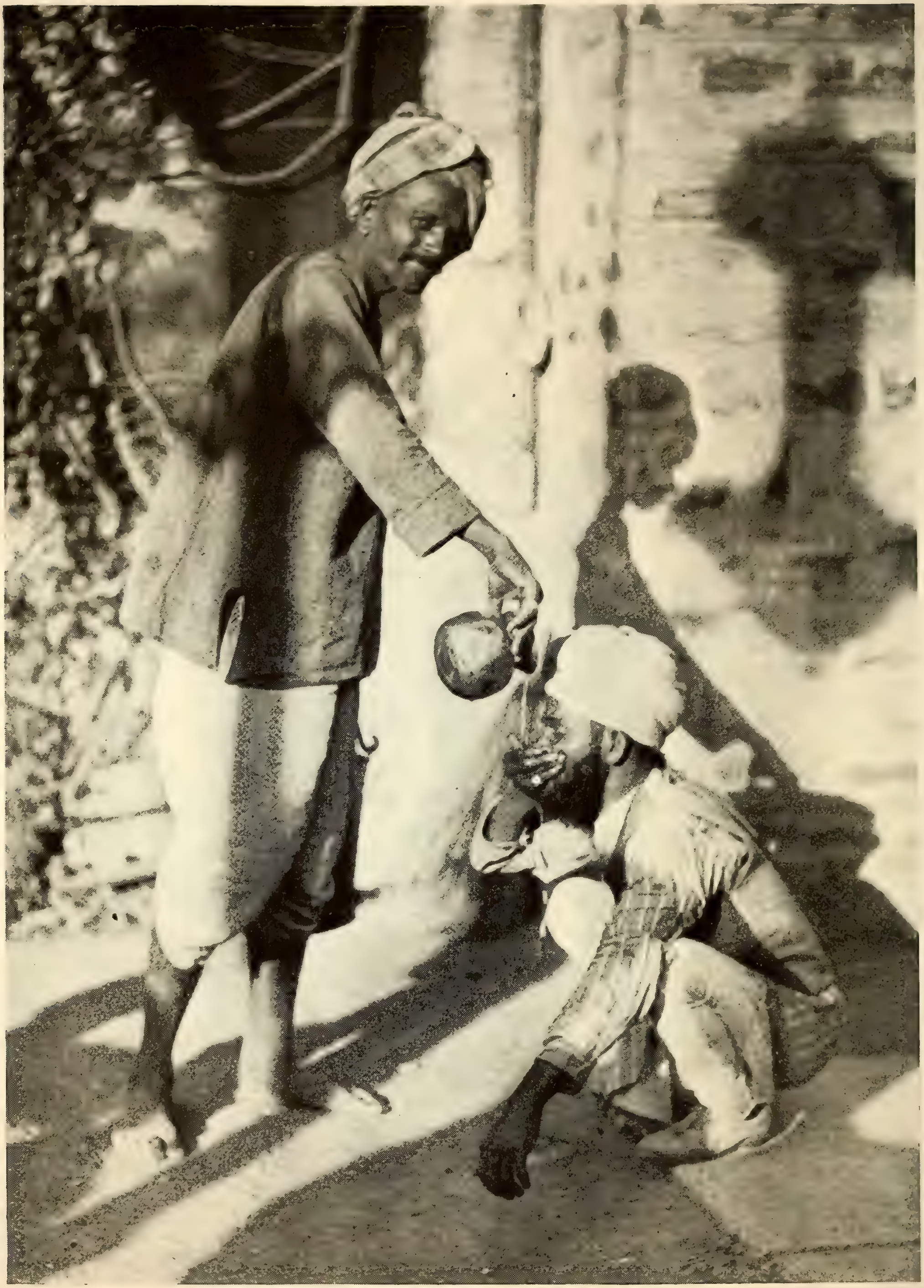
Between the Fort and Malabar Hill, at Bombay, there is a long line of beach which is very popular with the natives. There are no bath-houses, but each bather brings an extra costume. One serves as a screen behind which the dressing or undressing is carried on. The wet garments, after the bath, are dropped to the sand within the protecting circle of the clean garments, which are then donned, and a few sweeps of the wet sari against the hot air serve to dry it thoroughly.

while it is dangerous to take pictures of some of the women of *harem* or *purdah,* whether they are veiled or not.

In Cairo a Moslem woman with most hypnotic eyes was dictating a letter to a professional letter-writer. She sat perfectly still and looked straight into the camera when I asked her in sign language if I might take her picture. Obviously she was a person to whom I could not offer money, but I thought that such a woman would like to have a copy of the picture sent to her. The letter-writer, it developed, spoke English, and I was so grateful to this fair Egyptian for this unusual opportunity that I asked him to tell her that if she would give her address I would send her a print.

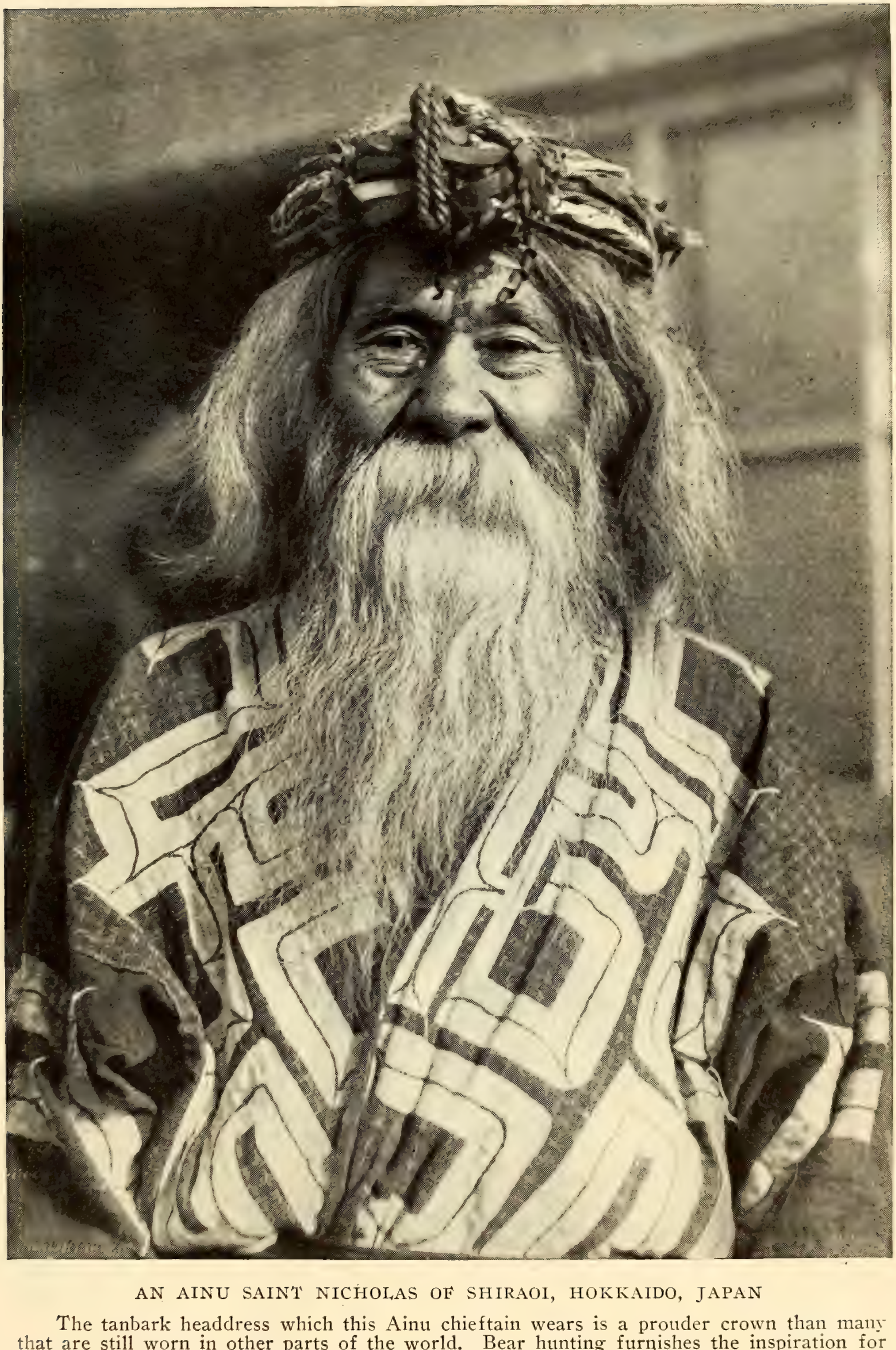
"If her husband know she let you take picture, he beat her," replied the scribe after a hurried consultation.

But out at the Pyramids two women



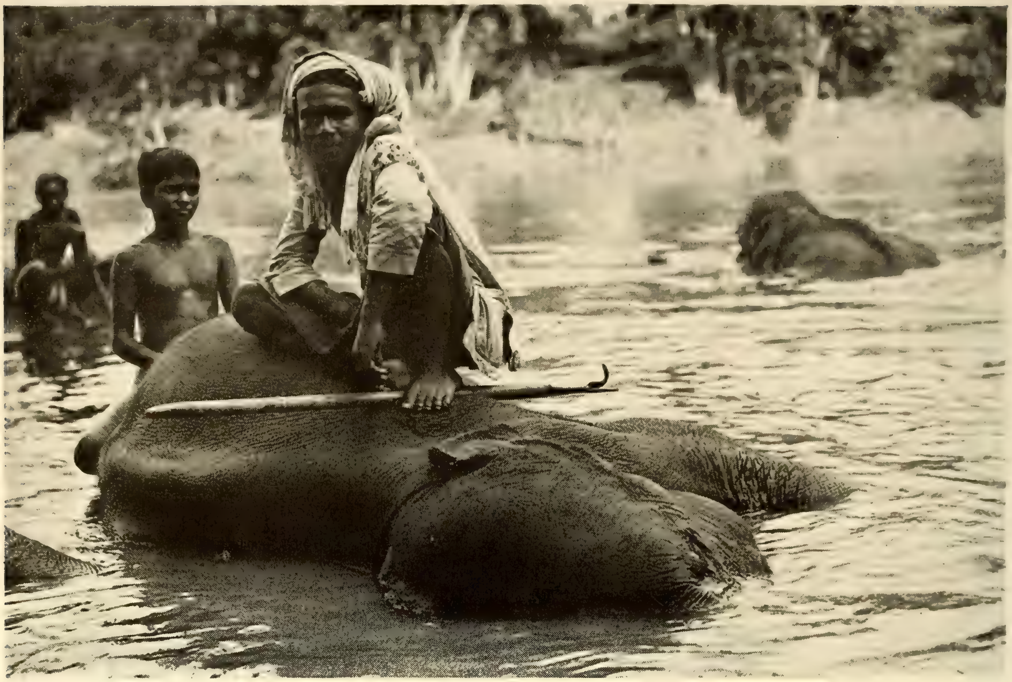
AN ORIENTAL SANITARY DRINKING FOUNTAIN

Eastern lands have their advantages, and among antagonistic races and faiths there are ways of living without offense. Syria has its nozzled jug from which one may drink without touching his lips to the vessel, and here in Udaipur, India, a Brahmin is giving water to a Mohammedan without danger of contamination by either, unless the Brahmin's thumb overreaches the brim of the brass bowl.



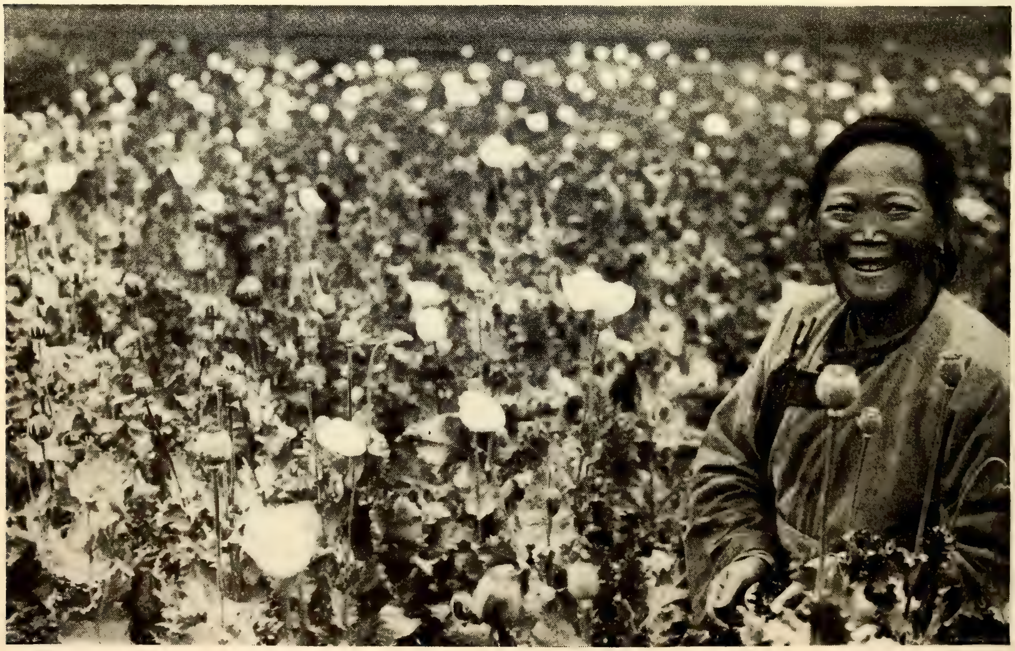
AN AINU SAINT NICHOLAS OF SHIRAOI, HOKKAIDO, JAPAN

The tanbark headdress which this Ainu chieftain wears is a prouder crown than many that are still worn in other parts of the world. Bear hunting furnishes the inspiration for many an Ainu tale, and, when the clans gather, a bear dance, in which grave men and ugly women with moustaches tattooed on their lips join, is always the head-line act.



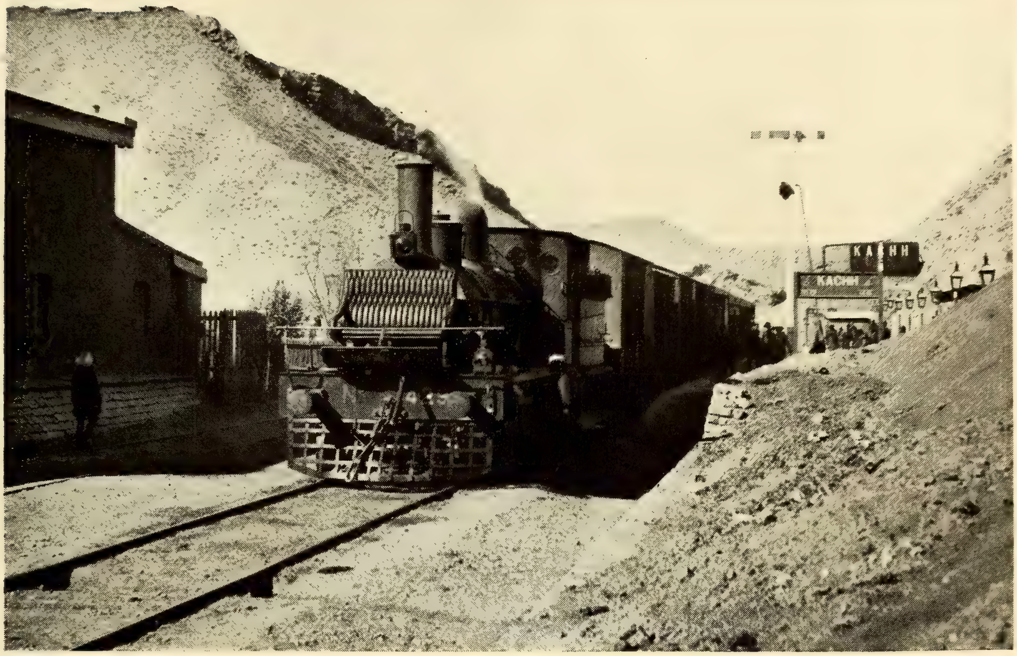
ELEPHANTS ARE STRONG ADVOCATES OF SHORT HOURS

In Ceylon the beasts of labor are worked only during the morning. By noon they are lying in the water of some palm-fringed stream, having their hides softened with plenty of water and coconut husks, briskly applied. Pachyderms do not have tender skins, but care has to be taken to see that they don't crack.



AN OPIUM POPPY FIELD IN FUKIEN PROVINCE

In the spring of 1919, when this picture was taken, the Chinese burned millions of dollars' worth of foreign opium in specially built furnaces at Shanghai; but the Chinese war lords of North and South induced the peasants in the region occupied by their mercenary armies to plant opium poppy in order to afford quick revenue.



AN OBSERVATION SEAT ON A TRAIN IN BRITISH BALUCHISTAN

One of the weirdest scenic routes in the world lies between Sibi and Quetta. A more direct though steeper route has largely superseded the Harnai loop, but the traveler is well repaid for abandoning the express and taking the trip through the barren hillocks which characterize this part of the world. With the thermometer at 25 degrees, this observation seat affords all the fresh air and wide prospect that any passenger could ask for, but it is only placed on the engine by special order of the railway officials (see text, page 91).

gladly let me take their pictures, both veiled and unveiled, and although neither would tell me where I could send her a picture direct, I did send photographs to the husband of one, while the other had her picture sent to her through her camel-driver!

AN ENCOUNTER ON THE BATHING BEACH AT DELHI

At Delhi there is a long sand-bar beside the River Jumna, where thousands of men and women bathe in the murky water. Here and there are small shelters in which the high-caste women change their *saris,* but the whole riverside is one vast open-air dressing-room, without a trace of immodesty on the part of any one. Food-sellers and hawkers of toys and notions dot the sands and the whole scene is a blaze of color and movement.

A six-foot foreigner wearing a glaring white sun helmet and carrying a camera has about as much chance of hiding in such a crowd as the man who sneezes while the tenor is climbing to his prize note, but I took several photographs of the crowd without any one showing hostility.

Then there came up a man who, by wearing a spotless turban, a well-pressed Prince Albert, and trousers rolled up to his bare knees, and carrying neat button shoes and ungartered socks in his hand, formed a fit subject for a photograph himself. Strangely enough, it did not occur to me or to him that he would do as a model for an art study.

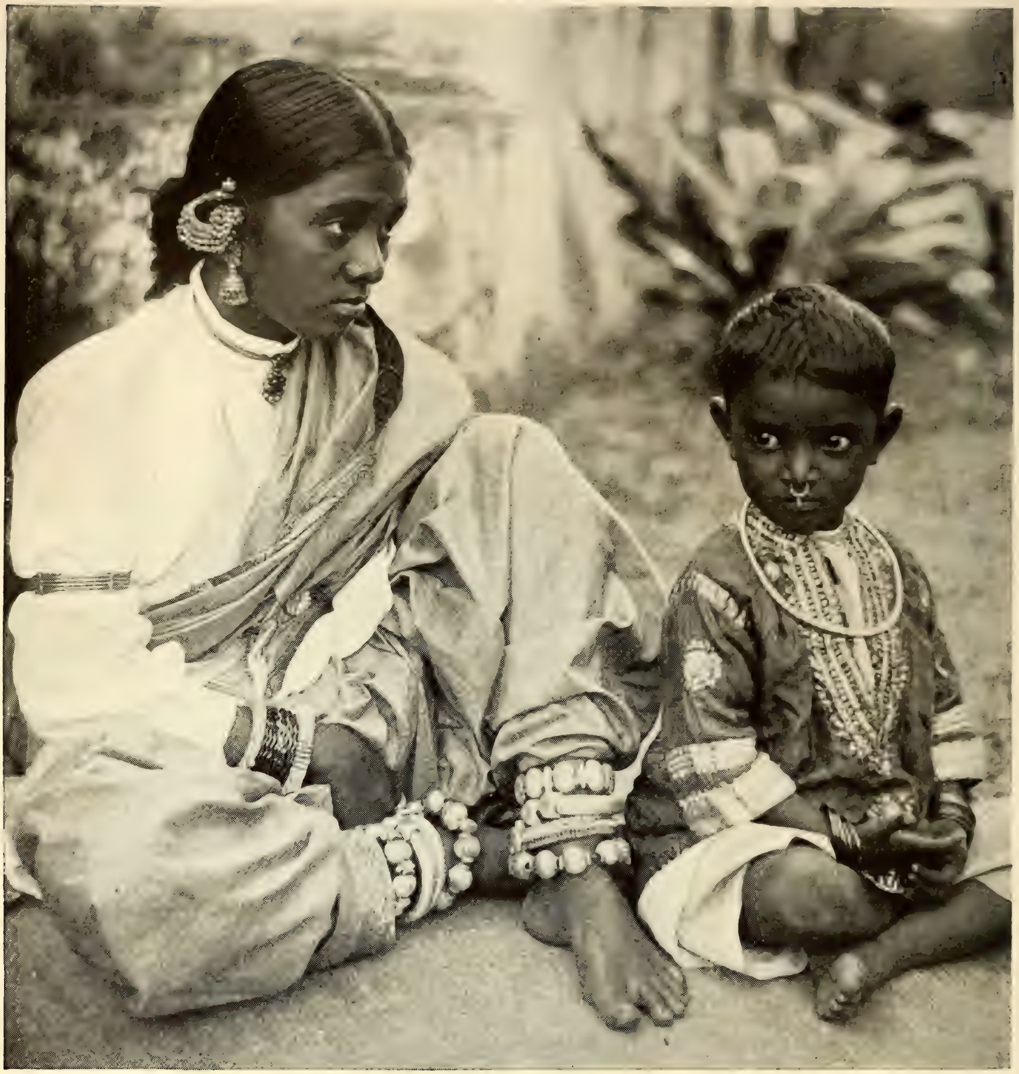
He told me that I really ought not to be taking pictures of the people. "Especially the women," he said.

"Why not?" I asked, just as though I was accustomed to seeing the outside world changed into a boudoir.

"All these women are in *purdah.* No man must look upon them," was his startling reply.

"How do you know there are any women here, then?" I asked.

At that moment a dusky queen passed



A HIGH-CASTE MOHAMMEDAN WOMAN OF ONGOLE, INDIA

Although Mohammedans keep their wives in close seclusion, the husband of this Moslem lady was so grateful to a Christian medical missionary for saving the life of his boy that he allowed a friend of the doctor to take her photograph dressed in her best silks and jewelry. The banks of India are wrists, ears, and ankles.

us, just as she had emerged from the water, with her gaily colored *sari* plastered to the lower portion of her body and with her well-built figure doing graceful imitations of a quickened Venus.

"That woman is in *purdah* and no man should see her," he replied, without denying that he did see her.

"I'm afraid she is not quite what I want, anyway," I replied. "But if she really desires seclusion, I think a Mother Hubbard would help a lot."

Women gladly consent to being photographed if they think they are well dressed, but woe to the photographer who attempts to take a picture of a woman in what she considers is not becoming to her!

FEMININE VANITY ON THE BANKS OF THE BRAHMAPUTRA

Our motor bus dropped down from Shillong to the banks of the Brahmaputra and stopped beside the little railway sta-

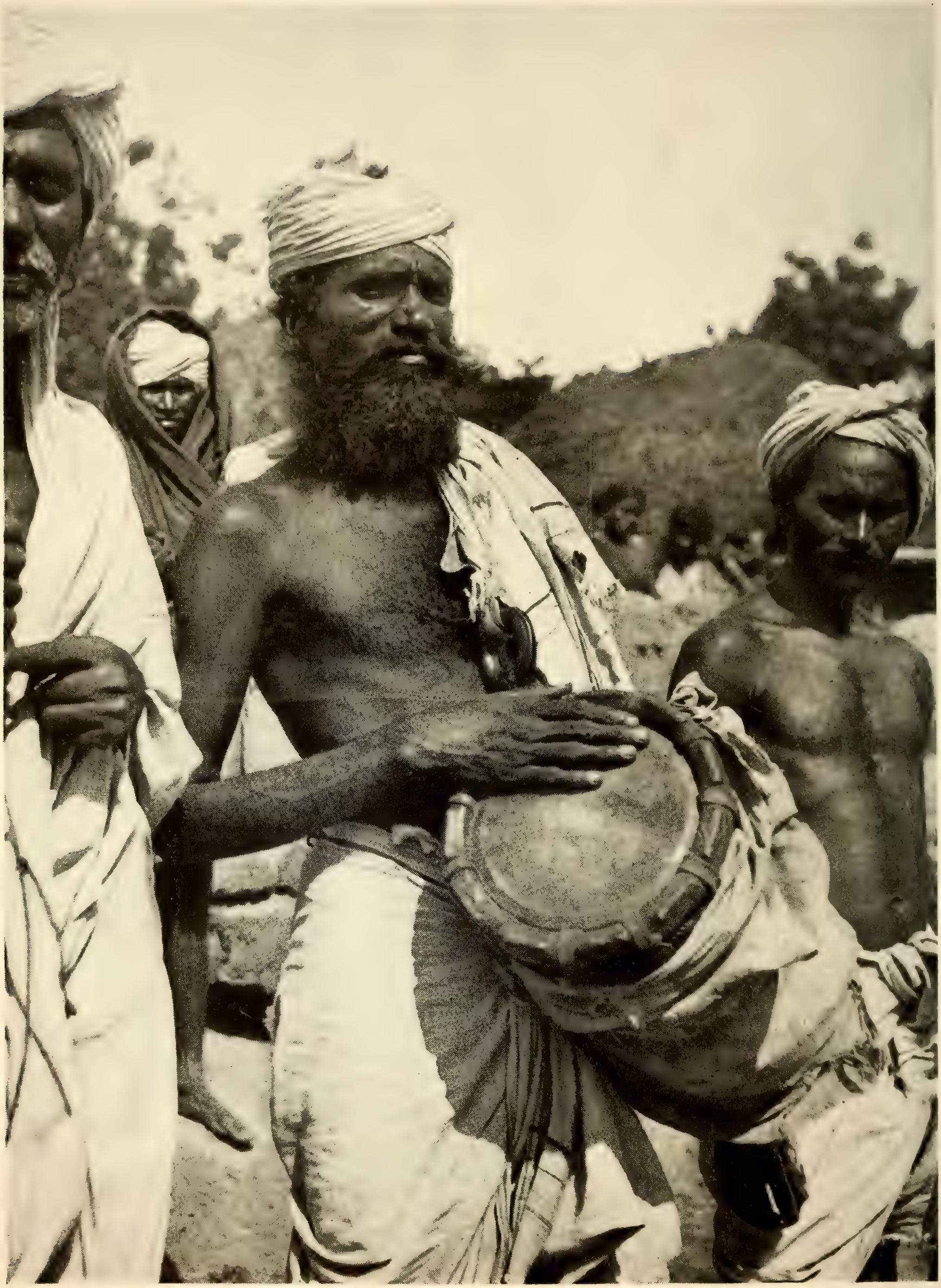
AT THE FOOT OF THE SHWE DAGON: BURMA

The famous pagoda at Rangoon attracts worshipers from all parts of the East, but at festival times the huge terrace from which the golden bell temple rises is the scene of gaiety. Impromptu picnics are held beside the many shrines which cluster about the main pagoda, a temporary stage is set up for the dances, of which the Burmans are so fond, and the big white cheroot demands a large place in the picture.

tion at Gauhati. It was to wait there for a few minutes before going on to the ferry crossing at Pandughat. So I shouldered my camera and went off to utilize the time. Seeing a very interesting old woman in the bazaar, I pointed to my camera and asked if I might take her picture. Her reply was to jump up with an alacrity surprising in one of her years and disappear into her home. Once safe in the shadow, however, she turned and signaled me to wait.

Down the village street, the motor bus soon turned the corner with a roar. Knowing that the Assam mails were in the body of the machine, and that time and tide set the tradition for the King's mails, I started away; but out from that doorway stepped my genial friend, proudly bearing up under the greatest weight of jewelry that I ever saw one woman wear.

While the mail waited and the motor horn honked, I took several pictures of the happy old lady, and then, with the last film wound from the roll, I snapped



A TELEGU MUSICIAN ACTING AS DRUM CORPS FOR A RELIGIOUS PROCESSION NEAR ONGOLE, INDIA

In the East the traveler is seldom out of earshot of some form of a tom tom to whose exotic tempo strangely dressed natives dance, march, or worship.

the shutter a half dozen times just to let her know that her kindness and fascination were appreciated.

USING A CAMERA IN JAPAN

Sometimes a photographer is embarrassed by official kindnesses. In Shiraoi, in Hokkaido, the Japanese were making a well-meant but vain attempt to inculcate into the Ainu their own love for bathing. As an aid to this object, they had built a bright new bath-house in the midst of the hovels in which the Ainu dwelt.

I was the guest of a Japanese official, and the right to take the official photograph of this auspicious occasion had been given to a commercial photographer. I had no desire to buy a formal picture of this group, in which the Japanese, clothed in Western dress, mixed with the fine-looking old Ainu chiefs and their wolfish-looking sons. I hinted as broadly as possible that I would like to secure some poses of my own, but all in vain.

One of the Japanese officials might be smiling or frowning or something, or his frock coat might not be buttoned properly, or his silk hat might not be held at the regulation angle, and an uncensored print let loose on the world might bring the Japanese Government and the Mikado into disrepute.

Until the ceremony was over, I was not allowed to take a single picture. But afterward I was at liberty to take all the pictures I desired, and secured a portrait of an Ainu Saint Nicholas which satisfied me better than would all the silk hats in Dai Nippon (see page 103).

THE SMILE TALISMAN IN CEYLON

A smile works in all languages and its power of reflection exceeds that of many a mirror. If this funny old world is ever to make friends with itself, it will be the face with the smile that wins. And to get a smile onto the face of an unwilling subject is not easy. Sometimes one has to resort to horse-play to get the people in good humor, and even when well-intentioned fun overshoots the mark, it is well to have established an atmosphere of friendliness.

One of the great prizes to the people of Asia is the tin container from which a film has been removed. These can be given away where money would introduce an undesirable element into the relations. But usually there are several claimants to the tin tube.

The tiniest baby is always entitled to first chance, but when the claimants are all of an age, I have had to decide by the ancient "eenie, meenie, miny, mo" method, and the result is usually great amusement and profound satisfaction by all concerned.

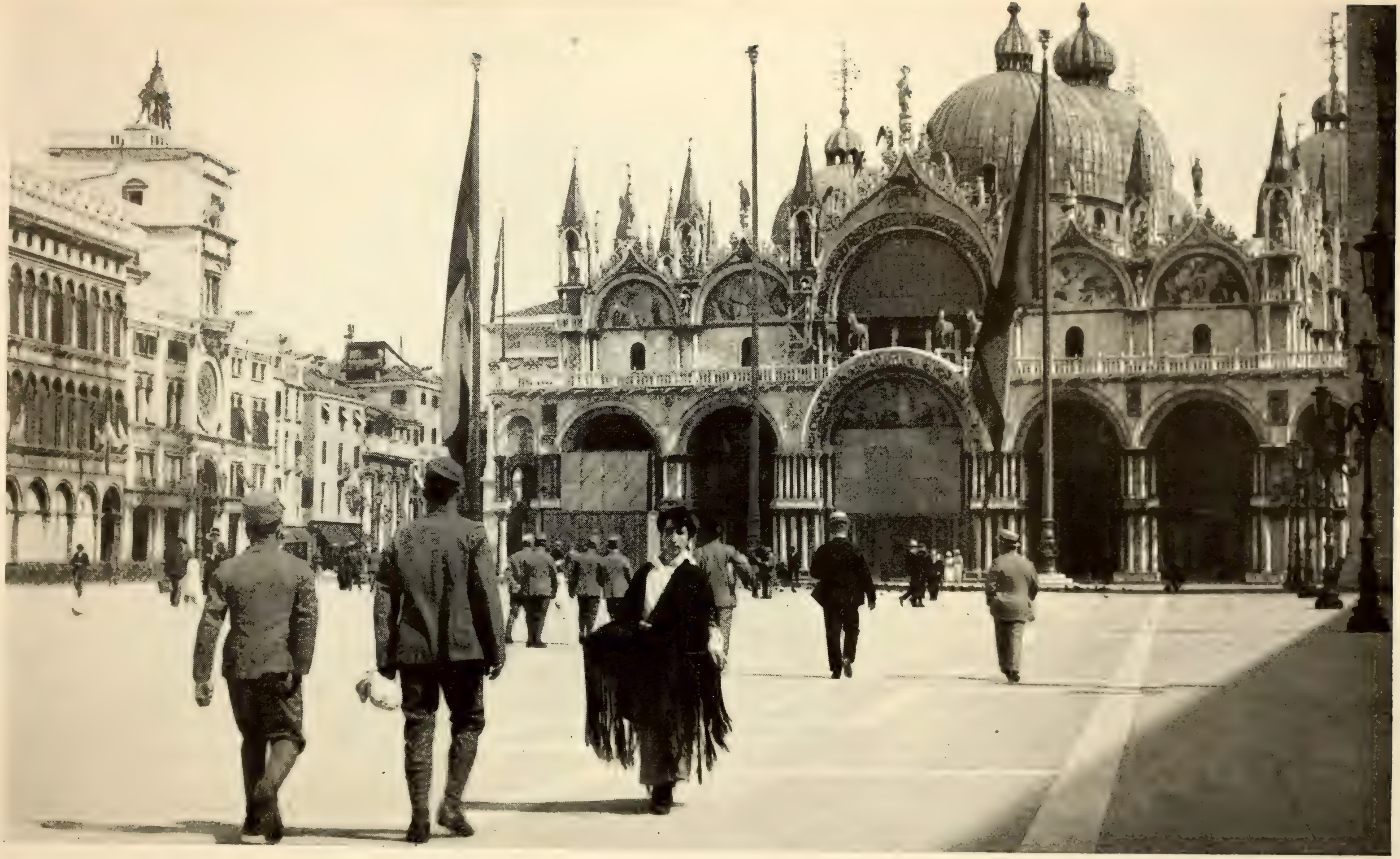
In Negombo, Ceylon, one small boy suggested that I throw the tube and let them scramble for it. That worked admirably the first time. But there was a small lad who seemed to lack strength or spirit and he gave signs of thinking that that was not a square deal.

All the boys were barelegged and I stood near the edge of a shallow pool. This small boy was nearer to the water than the rest; so, while pretending to throw the second tube ahead of me, as I had the first, I tossed it over my shoulder into the water. It fell quite near the disconsolate youth, but others were quicker. A more agile boy rushed for it and, stumbling over a guy rope, fell sprawling into the water.

WORKING AGAINST SUPERSTITIONS IN THE ORIENT

There was nothing for me to do but laugh as loudly as the rest, and when the boy picked himself up with the prize in his hands and a smile on his face, every one was happy. But I was glad that he did not wear a Little Lord Fauntleroy suit and a broad, starched collar, and that I had made friends with the crowd before the accident happened.

Throughout the Orient there are innumerable superstitions which make it difficult to secure personal photographs. Not only are Oriental men jealous of their women folk, but there are few places where the illiterates do not have some fear of the evil eye. Many fear misfortune if their picture is taken, and there are still Mohammedans who have a religious objection to lending themselves to the representation of living beings. A people who have made caligraphy their ideal of art do not readily lend themselves to portrait work.



"LA PIAZZA," REMINDER OF THE GLORY OF VENICE

Neither uniform nor deep-fringed shawl, straw hat of tourist nor gay pennons, can bring back the proud days before Vasco da Gama humbled the queen city of the Adriatic. But in the evening, when the pigeons have gone to perch under the rich arches of the great cathedral with its Byzantine domes, when the marble pavement is edged with tables and chairs, and a Venetian band is playing "La Paloma," the Piazza of St. Mark is a place which intrigues one's interest and inspires long and tender memories.

Many fear that if their photographs are taken their bodies will waste away. This belief is especially common among the Ainu, and some photographers have risked their lives because of their indiscretion in photographing those who are obsessed by such fears.

When there is a flat-footed refusal of the right to take pictures, one must desist; but ignorance of the language spoken by the people helps a great deal. Most people are shy about having their pictures taken, but this shyness quickly melts before a sincere smile, and when to apparent friendliness is added the pitiful spectacle of lingual helplessness, there are few who can refuse the respected foreigner's request.

A PHOTOGRAPH THAT REPRESENTS GRATITUDE

Many a Moslem husband has allowed me to photograph his women folk, and the toleration of these people in letting visitors see and photograph their mosque services is worthy of mention; but the most memorable case of Moslem magnanimity of my experience occurred in Ongole, where a Christian missionary had saved the life of an Indian Moslem's son, and this man, out of trust and gratitude, allowed me to photograph his family, with his wife unveiled, because I was a friend of the doctor (see page 106).

Throughout the East there is a hearty response to genuine friendliness. The native is not accustomed to familiarity with the white man and at first he resents it, because he does not understand the motives, but I have never met with anything other than the utmost politeness among the common people of Asia.

More troublesome than those who resent having their pictures taken are those superactive and ubiquitous imps who insist on being in every picture. One lad bothered me a great deal when I was trying to photograph a street scene in Buddh Gaya, India, though obviously he had as much right to the locality as did I. Since I could not remove him, I tried to get him to loosen up his frame a little and look more like Tom Sawyer and less like a monument. When I had shown him how to do it, and returned to my place, I turned to find him doing a scarecrow dance that would have won plaudits in the "Wizard of Oz" or done credit to Saint Vitus himself.

In the spring of 1919 the Chinese burned millions of dollars' worth of opium, not individually, in small doses, but collectively, in huge incinerators opposite Shanghai. At that time I was in the interior of Fukien, in the bandit-infested region between the Northern and Southern troops, and passed through wide fields of opium poppy which the people had been induced to plant so as to afford quick revenue to the war lords who were then ravaging the province.

A friend, to whom I mentioned my desire to get a photograph of this condition of affairs, said that if I attempted to photograph opium poppies the Chinese would probably try to destroy my camera, as they had no desire to be thus convicted of duplicity. I took a score of pictures in the poppy fields, showing the cultivation of the opium plants and the gathering of the milky juice from the poppy pods, but no one showed the slightest objection.

In Japan I met a man who was roundly condemning the Japanese for preventing foreigners from taking pictures and who was exceedingly surprised to know that, outside a few fortified areas, a camera can be as widely used in Nippon as in the United States.

He had attempted to take forbidden photographs at Nagasaki and had been so badly frightened by the police that he packed away his camera for weeks. Yet even in Nagasaki the government would gladly have furnished him a police officer, under whose surveillance he could have taken any legitimate views.

A RACY ENTERTAINMENT AT BEIRUT

While wandering around the waterfront in Beirut on one occasion, I saw a group of porters paying good money to look at a small peep-show which, judging from the laughter, was not of the most elevating variety. A little shamefacedly, I paid my *metalik* and looked at the exhibition.

I certainly got my money's worth, if side-lights on foreign life are worth anything. Four of the pictures were cover drawings from a popular American weekly magazine, with the full title left on and nothing added. A fifth was a foreign calendar issued by one of the shops of Beirut. It was a very racy entertainment for those barbaric burden-bearers, but there are few American mothers who would not have given such pictures to their five-year-olds.

Throughout northern India there wander Kashmiri musicians, usually with a young boy dressed in girls' clothes to dance to their exotic music. In Rawalpindi the native Christians were holding their Christmas entertainment outdoors on the campus, and a band of these musicians strolled up to watch the games and listen to the recitations and songs, such as a Christmas program produces in every corner of the world.

Their eyes glistened at this ready-made audience and the promise it gave for profit if they could only substitute barbaric music for hymns and sinuous dances for obstacle races; but the missionary tactfully explained that the program was already a long one—the Kashmiri was not familiar with Christmas programs—and that there would be no chance for them to entertain the Sunday-school scholars.

The wistfulness of those poor minstrels, standing outside that gay crowd, with presents being distributed and everybody radiant with the Christmas spirit, and being unable to contribute to the entertainment was a memorable sight. They seemed to feel as badly as a pickpocket would at not being asked to perform before a millionaire Sunday-school class.

THE TRAGEDY OF "THE" PICTURE

Out in Beirut, Syria, the day came when I secured THE picture. As soon as the shutter snapped, I knew that I had a wonder. In the dark room the plate surpassed my fondest hopes, and I think I dreamed that night of the wonderful picture which I had put out to dry on the window-sill.

With the coming of daylight I went to look once more at my treasure. The weather at that season was damp and the emulsion was still wet; but the picture was more beautiful in the soft light of early morning than it had been by lamp light. I shaved with a song on my lips. Deborah might have composed the words, if there had been any. Triumph rang from every note.

Then the sun rose over the Lebanon, whose lofty line, punctuated by snow peaks, faced my window. The quick warmth of the Oriental sun promised to dry the plate quickly after the muggy night. I went back to the window to gloat once more. The dream picture was a black smudge on the limestone ledge. Phœbus had glimpsed the beauty and had melted the emulsion on the plate like the wax on the wings of inordinate Icarus.

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THE WILD LIFE OF LAKE SUPERIOR, PAST AND PRESENT

The Habits of Deer, Moose, Wolves, Beavers, Muskrats, Trout, and Feathered Wood-Folk Studied with Camera and Flashlight

BY GEORGE SHIRAS, 3D *

AUTHOR OF "PHOTOGRAPHING WILD GAME WITH FLASHLIGHT AND CAMERA," "WILD ANIMALS THAT TOOK THEIR OWN PICTURES BY DAY AND BY NIGHT," "ONE SEASON'S GAME-BAG WITH THE CAMERA," "A FLASHLIGHT STORY OF AN ALBINO PORCUPINE AND OF A CUNNING BUT UNFORTUNATE COON," "THE WHITE SHEEP, GIANT MOOSE, AND SMALLER GAME OF THE KENAI PENINSULA, ALASKA," AND "NATURE'S TRANSFORMATION AT PANAMA," IN THE NATIONAL GEOGRAPHIC MAGAZINE.

CHAPTER I

LAKE SUPERIOR is nature's greatest reservoir of deep, pure water in the world. Four hundred and fifty miles long, one hundred and sixty-seven miles wide, having a maximum depth of a thousand feet, its bottom four hundred feet below sea-level, with some two hundred tributary streams and the greatest snow precipitation east of the Mississippi, this great crescent-shaped basin has remained at the same level for centuries.

Overflowing, in a series of tumultuous rapids, the rock-rimmed shore at the eastern end, the excess waters have channeled out the beautiful Sault Ste. Marie River, with its wooded islands and many bays, passing thence through straits, rivers, lakes, and a great estuary to the sea, two thousand miles away.

PRIMITIVE ROCKS AND VIRGIN WATERS

The ancient formations of Lake Superior are grouped into three great divisions — the Archean, Algonquin, and Cambrian — each separated by unconformities of great magnitude. While of interest to the geologists, for here are the finest iron and copper deposits in the world, besides marble and granite, slate and sandstone, the basic divisions may be treated as rocks of crystalline and sedimentary origin.

Included in the latter is the "Lake Superior sandstone," unique in containing little or no fossil remains, indicative of its early formation.

The surfaces of the primary rocks are heavily scored by glacial action, while the overlying strata of sandstone, often many thousand feet thick, have been fashioned by the elements into fantastic and impres-

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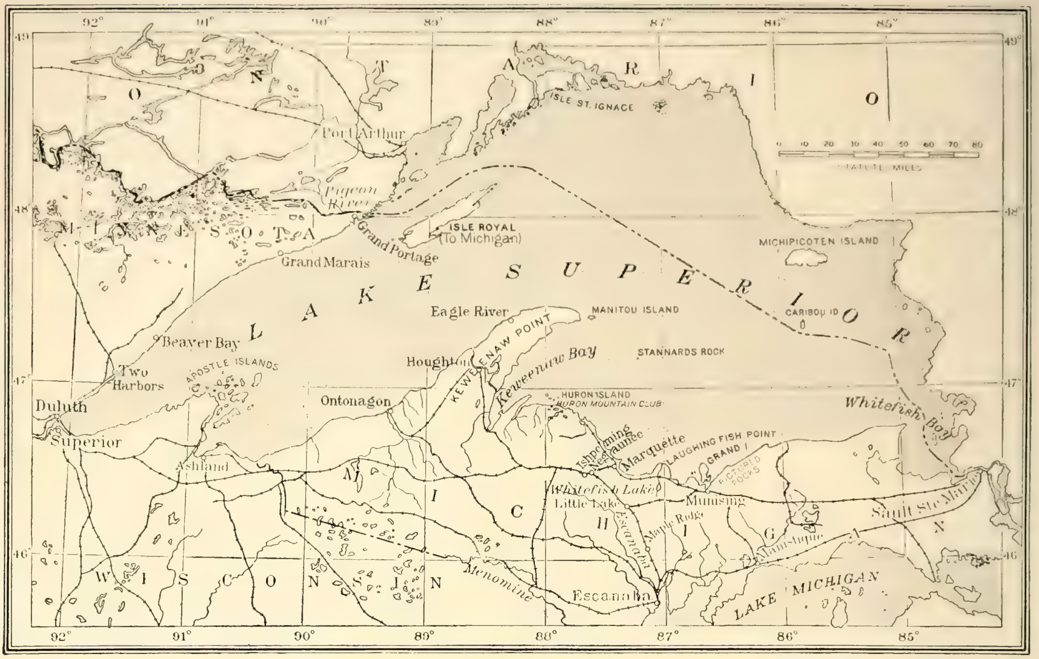
* In 1849 the paternal grandfather of the author visited Lake Superior to fish for speckled trout, at a time when there was only a scattered settlement or two, and before a lock had been constructed around the rapids at the head of St. Marie's River. In these vast waters he fished until his 89th year.

Then in 1859 came the father, as a fly-fisherman, later a Justice of the United States Supreme Court, who now, in his 90th year, continues his annual visits.

Finally came the author in 1870, who herein describes his own experiences of fifty years, first with the rod and gun, and then with the camera and flashlight, which brought to the sportsman and the naturalist a new pleasure and a new means of studying and photographing wild life.—EDITOR.



Drawn by A. H. Bumstead

A MAP OF LAKE SUPERIOR SHOWING NORTHERN MICHIGAN AND WISCONSIN, EASTERN MINNESOTA, AND WESTERN ONTARIO

Among the points of interest mentioned in the narrative and indicated on the map are: Marquette, Whitefish Lake, Grand Island and Pictured Rocks, St. Ignace Island, and Stannards Rock.

sive shapes, resembling battlements and turreted castles, separated by high, perpendicular cliffs of variegated colors.

These cliffs contain caverns into which the larger craft may enter. One group on the southern shore is known as the "Pictured Rocks," originally the most famous of our natural phenomena, but now somewhat overshadowed by the magnitude and diversity of the Rocky Mountain region though still without a counterpart in coastal scenery (see pages 116, 117, 118, and 144).

In topography and scenic beauty the north shore resembles somewhat the southern shores of Alaska, for it is elevated, rock-bound, with many clear, turbulent trout streams cutting through the dark coniferous forests and plunging down the steep water-shed into the crystalline waters below.

WILD LIFE ON THE ISLANDS

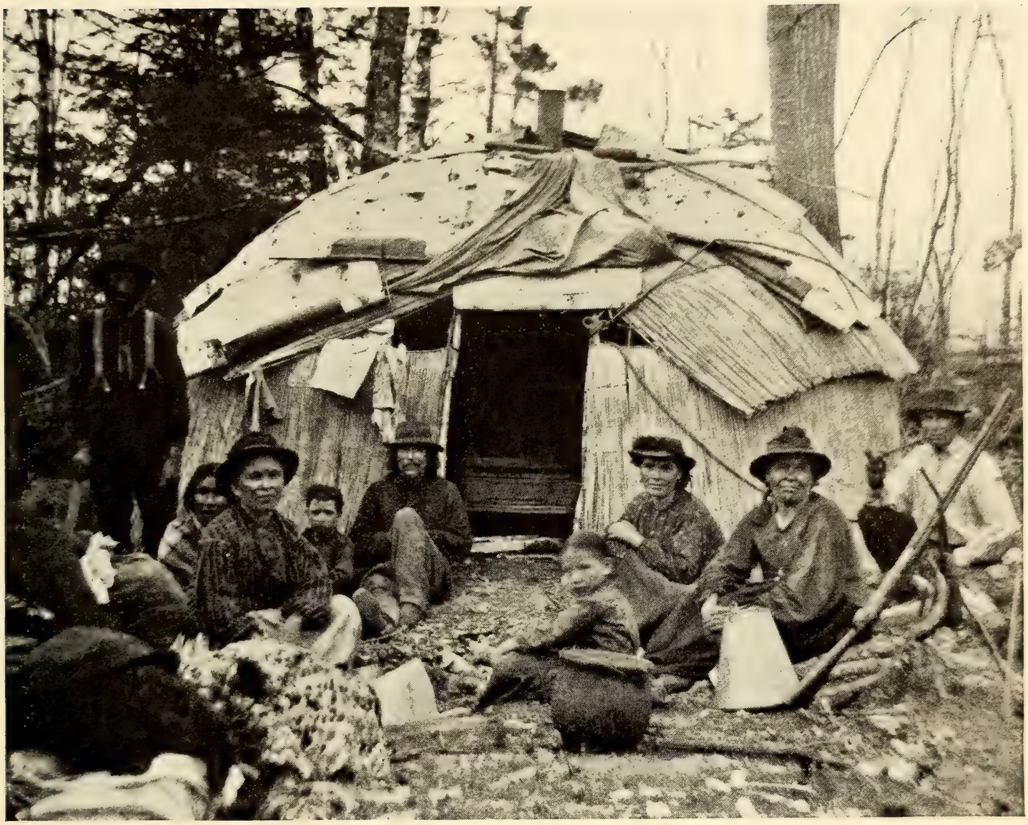
Here is also an archipelago of wooded islands, some surmounted by rocky domes of a thousand feet or more, the larger containing moose, deer, caribou, and bear, between which and the main shore are deep, tortuous channels and many safe harbors, affording ideal cruising grounds for the sportsman and tourist.

The south shore resembles more the northern Atlantic coast, with here and there precipitous cliffs and rocky promontories, separated by long stretches of sand beaches and deep bays, the islands and harbors infrequent.

PRIMEVAL FORESTS AND SUCCESSIVE GROWTHS

Circling the coast, the forests are much the same, except that the rotund spruce of Ontario is replaced on the Michigan shore by towering hemlocks, the roots of which turn the streams into a deep wine color; so that the speckled trout, in darker hues of brown, red, and orange, are in characteristic contrast with the silver and pink of those in the lake.

When travel by water was the principal means of seeing the lake country, it was assumed that upper Michigan was a vast pinery, for its shores and the interior streams were fringed with green through-



DOME-SHAPED LODGE OF THE OJIBWAYS

The Indian to the right is Chief Kawbawgam, who with his family lived on Presque Isle, now a suburban park of Marquette. He reached the unusual age of one hundred years, and now a large boulder is his monument in the park. The standing figure at the left is Jack La Pete, who acted as guide for four generations of the author's family. He died in his ninety-eighth year. Such longevity was most unusual among these Indians.

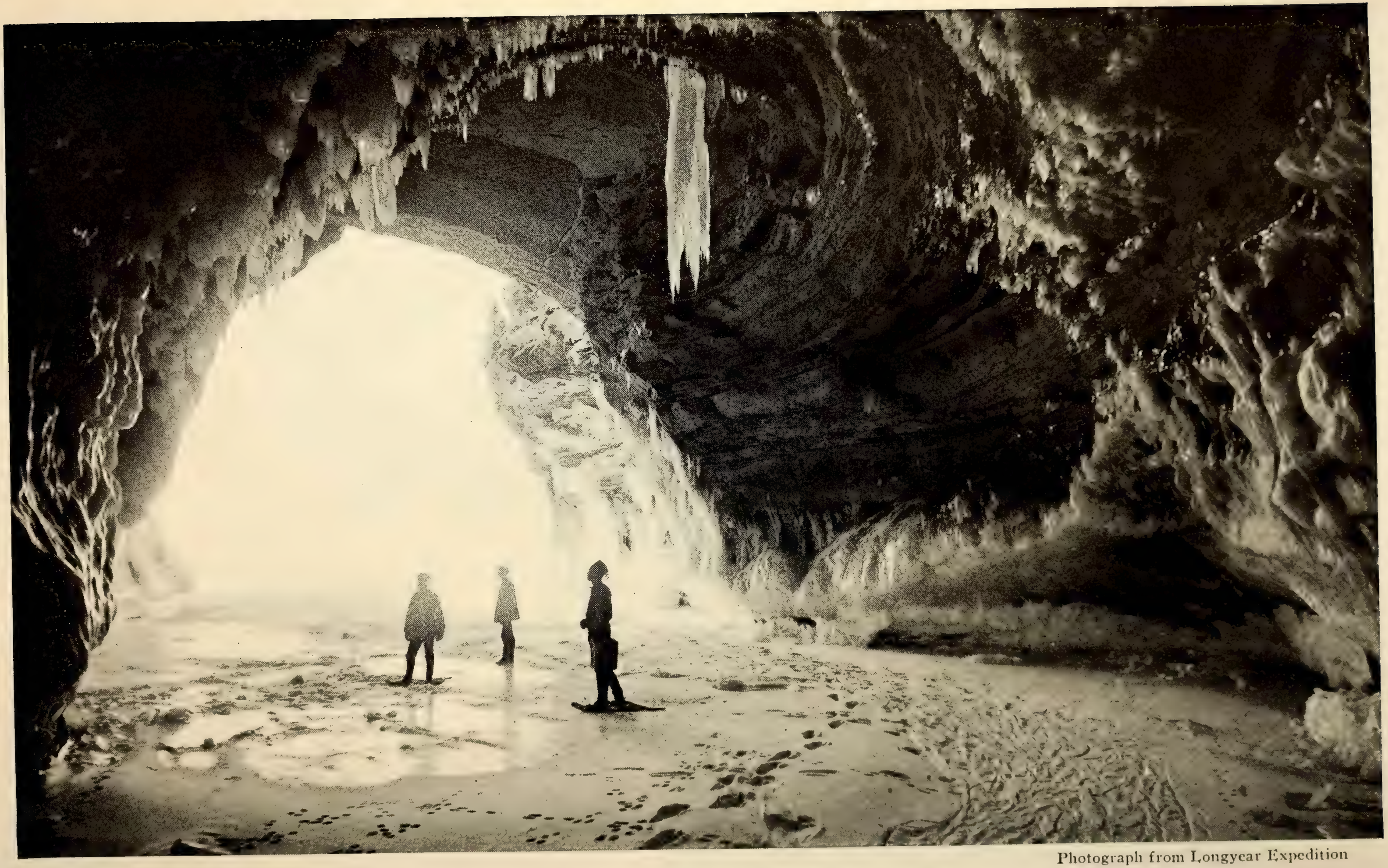
out the year, and visible in the open months were the buoyant pines floating down many streams to be rafted on the lake for the eastern market.

When the railways and the logging roads reached the higher ground, extraordinary forests of hardwood were discovered, consisting of millions of acres of sugar or hardwood maple in solid stands, with an abundance of beech, yellow birch, basswood, ash, and elm, resulting in the development of many woodworking establishments and the largest wood charcoal furnaces in the world (see page 122).

The abundance of sugar maples at the present time warrants a syrup production exceeding Vermont and New Hampshire, where generations of thrifty farmers have tapped every scattered grove in conserving nature's sweetest offering.

Nowhere, probably, on the continent is the fall foliage more beautiful in brilliancy or contrasting colors. Much of this gorgeous display is of recent origin, for with the removal of the older forests, the increase of rural clearings, and the unending vistas of the interior driveways came a second growth of low-branched, symmetrical trees, one of which, the soft maple, is spreading rapidly; for, when cut to the ground, from the stump springs a spray of green saplings, in the autumn turning to a fountain of pink and red, many of the leaves splotched like a painter's palette.

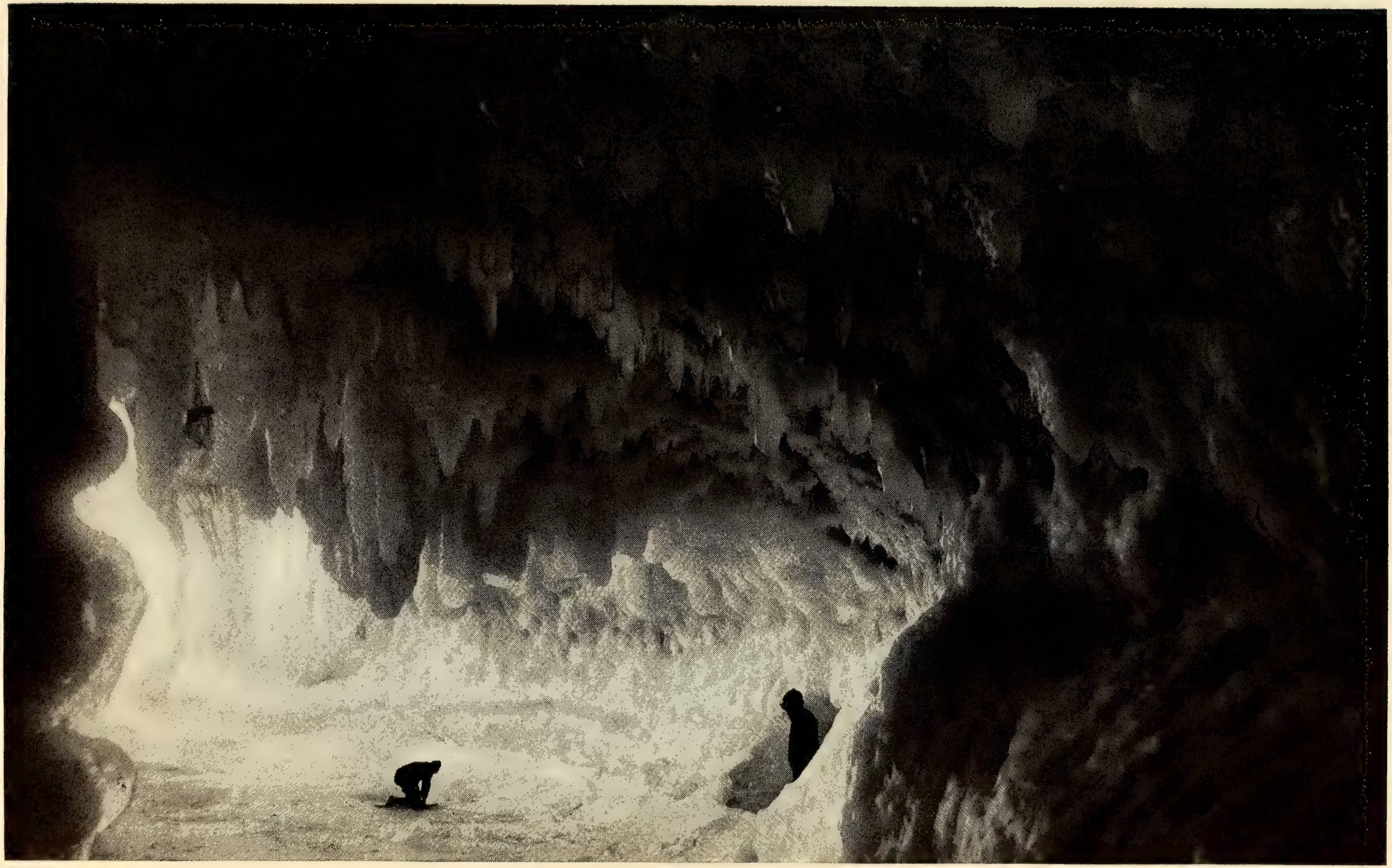
Equally abundant is the yellow-leafed poplar, fluttering in the slightest breeze, while the bronzed beeches and the lavender of the wild cherry are interspersed with the mountain ash, bending beneath



Photograph from Longyear Expedition

WINTER'S HANDIWORK: PICTURED ROCKS

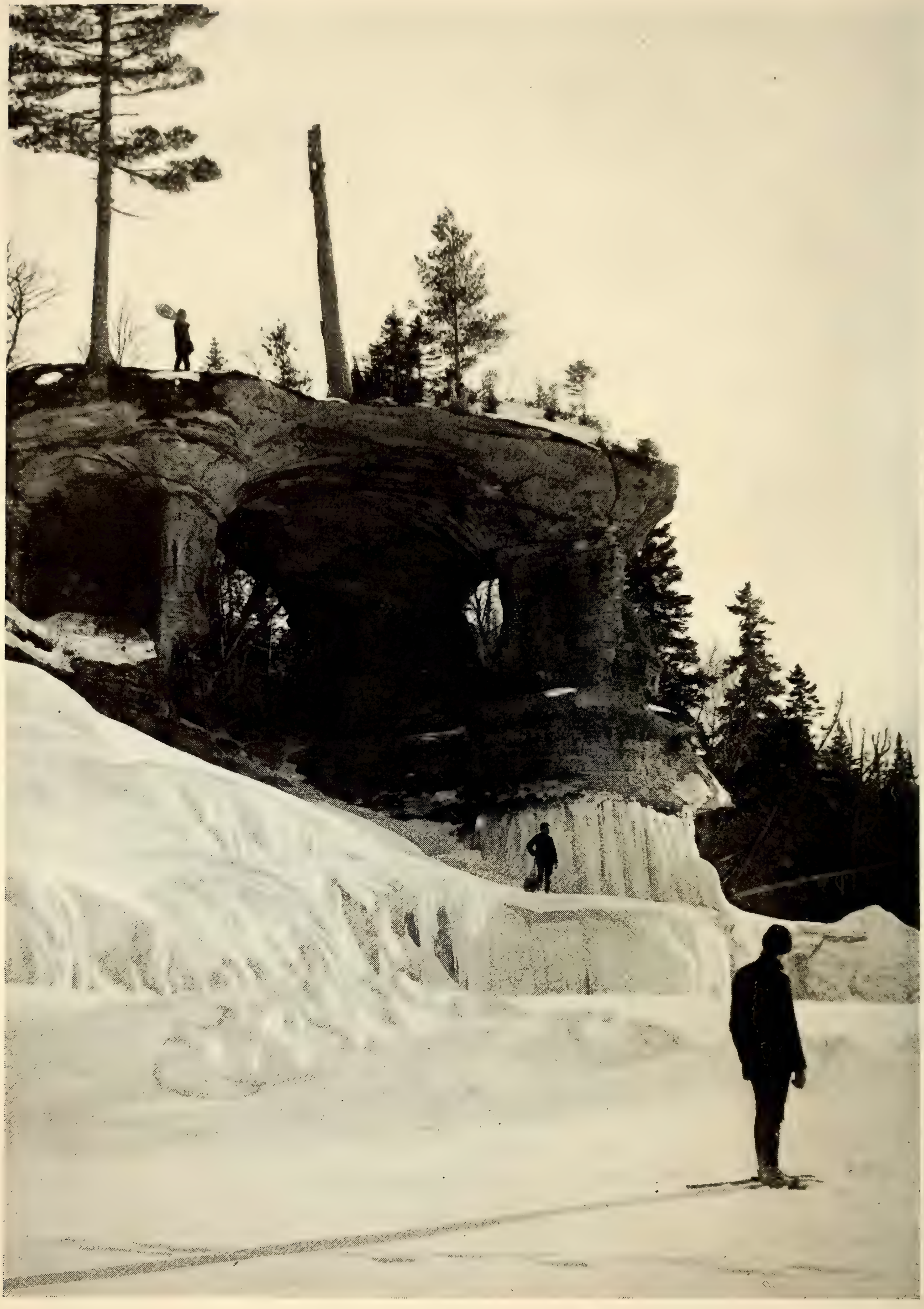
In the summer the transparent waters disclose the curved bottom of this rotund and gloomy cavern. When winter paves the floor in white, fills the lower crevices with ice, and forms pendant prisms on the arched entrance, the transformation is one of radiance and beauty.



Photograph from Longyear Expedition

GRAND PORTAL: PICTURED ROCKS

A winter view of a large cavern in the variegated sandstone cliffs east of Grand Island, where surging waves have formed a wainscoting of ice, and a myriad of stalactites on the domed ceiling. Occasionally the ice contents remain until July first.



MINER'S CASTLE: PICTURED ROCKS

With the base resembling Carrara marble, this striking design of Nature has been much changed in winter.

its clusters of red berries, the more brilliant hues alternating with the contrasting greens of the balsam and cedar, and back of which often lie great uncut forests of hardwood maple in a monotone of orange, the edgings carpeted with the crimson hether of huckleberry, while daisies, goldenrod, and giant ferns join in the culminating efforts of the ebbing year.

The interior lakes and ponds present the climax of this hectic season; for nature, flushed with intermittent frosts, duplicates its colors on the mirrored surfaces, all domed with the azure of the northern sky.

THE OJIBWAY INDIANS

Lake Superior was thoroughly explored and was a busy field for the Jesuit missionaries long before any other portion of the western country had been visited by the white man, for the hardy *voyageurs* used the great watercourse from the sea when settlements on the Atlantic coast were few and far apart.

In 1658 Radisson, the fur trader, gave the first written description of the south shore, followed in 1660 by Father Menard, in 1665 by Allouez, and in 1669 by Marquette. Some evidence exists for believing that this region was visited by white men long before these dates, it having been asserted by Chase S. Osborn, former Governor of Michigan, that so far back as 1542 Roberval's men penetrated thus far.

Among the first of the resident Indians on Lake Superior were the Ojibways, commonly called Chippewas. Belonging to the Algonquins, it is supposed they were driven west, along the Great Lakes, by the more warlike Iroquois, and on reaching the terminal waters found the Sioux, a tribe of similar habits and disposition, in possession.

Then ensued a bitter warfare; but the Ojibways, having a continuous supply of guns and ammunition from the east, drove their rivals out on the prairie country, where they became pony Indians, changing their habits materially.

The dividing line between these contending forces was Minnesota, the wandering trapper being able to recognize the different tribes by the tall, conical-shaped lodges of the Sioux and the low-domed ones of the Ojibways (see p. 115).

Hunting, fishing, trapping, and the use of the birch-bark canoe developed self-reliance and a habit of occupying more or less permanent locations within sight of the water, in contrast to the nomadic life of most western Indians.

THE INDIANS LIVED LARGELY ON FISH

In the early days there were neither moose nor deer and very few caribou, compelling the aborigines to live largely on fish, which were easily obtained from the Sault Ste. Marie River, where the rapids remained open during the winter, and here was established their largest village, bringing them into contact with travelers, whom they served as guides and packers. They were recognized as the most dependable and responsive members of their race, for early intercourse with the missionaries prepared them to welcome the white man as a friend.

At the present time the Ojibways have practically disappeared from the south shore, but are still to be found in considerable numbers throughout western Ontario and northeastern Minnesota, where the abundance of fish and game, supplemented by an annual pension from the United States and Canadian governments, favors their existence. Under conditions very similar to those of a hundred years ago, sportsmen and tourists are given an insight into the life of the tribe which inspired the story of Hiawatha.

CHAPTER II

FIRST OUTINGS TO LAKE SUPERIOR

In 1869 I was presented with my first gun, a small-bore, muzzle-loader, with which, under parental instruction, I was able to bag a few squirrels, quail, and rabbits in the wooded country below Pittsburgh, on and near the banks of the Ohio.

This gift was in view of a coming trip to Lake Superior the following year, where I was to be permitted to travel on ancestral trails to a region of hearsay, and to see with my own eyes this wonderful body of water and tributary streams, the great forests of pine and hardwood, the picturesque Ojibway Indians in their birch-bark canoes, and, more than all, the trout, grouse, wild pigeons, deer, bears, wolves, and many fur-bearers which tenanted the streams and arboreal retreats of a pristine wilderness.

Fated to continue on and on in this inherited privilege, half a century has now passed in a study of the wild life in a great homogeneous area, where the extinction or marked declination in certain forms have been compensated by the gradual appearance of species new to the region, accompanied by the gradual increase of some of the more valuable birds, animals, and fish so improvidently decreased in pioneer days.

Anxious to see the surrounding wilderness, a chance came to me when a family party started on a camping trip to the mouth of Huron River, fifty miles to the west of Marquette, a remote portion of the southern shore, where there was not a single habitation between the town and the camping place.

Transported by steamer to within five miles of the shore, several yawls, with canoes in tow, were soon under way. Passing the Huron Islands, dotted white with nesting herring gulls, among the first of the northern bird refuges to be established by President Roosevelt thirty-five years later, we landed in a small clearing near the entrance to the river, where the tents were erected, and then began ten most interesting days beneath the canvas.

INDIAN GUIDES OBJECTS OF INTEREST

The Indian guides were, perhaps, the object of greatest interest, for they gave much attention to the two young members of the party, whose incessant questions were only equaled by raids on the provision tent.

Trout, grouse, and pigeons were abundant and many deer tracks along the banks indicated what might be done in the hunting season.

Among the guides was one first employed by the writer's grandfather in 1850. His swarthy complexion and comical expression led to his being called Jack La Pete, through a supposed resemblance to the Jack of Spades (see page 115). Jack was small, thin, and active, with a volubility in striking contrast to the taciturnity of his race, a trait possibly due to a trace of Hibernian blood, for in other respects he resembled the Ojibway Indians.

During long contact with the better class of pioneers, who were intent upon the permanent development of a country rich in minerals and timber, and often acting as guide to those seeking to enjoy the abundance of game and fish, Jack became possessed of a greater knowledge of worldly affairs than any of his associates, and the fact that he had spent a year in Washington as interpreter in litigation affecting his tribe added further prestige.

About the camp-fire in the evening he made us little birch-bark canoes initialed with the quills of the porcupine, while the spreading tail of the grouse became a fan and the skin of a muskrat was made into a shot-pouch. In conversation he was equally active, and told many weird tales, including a personal interview with the great Manitou, who on one occasion came down the clay chimney of his cabin and with a mysterious incantation restored Jack's failing eyesight.

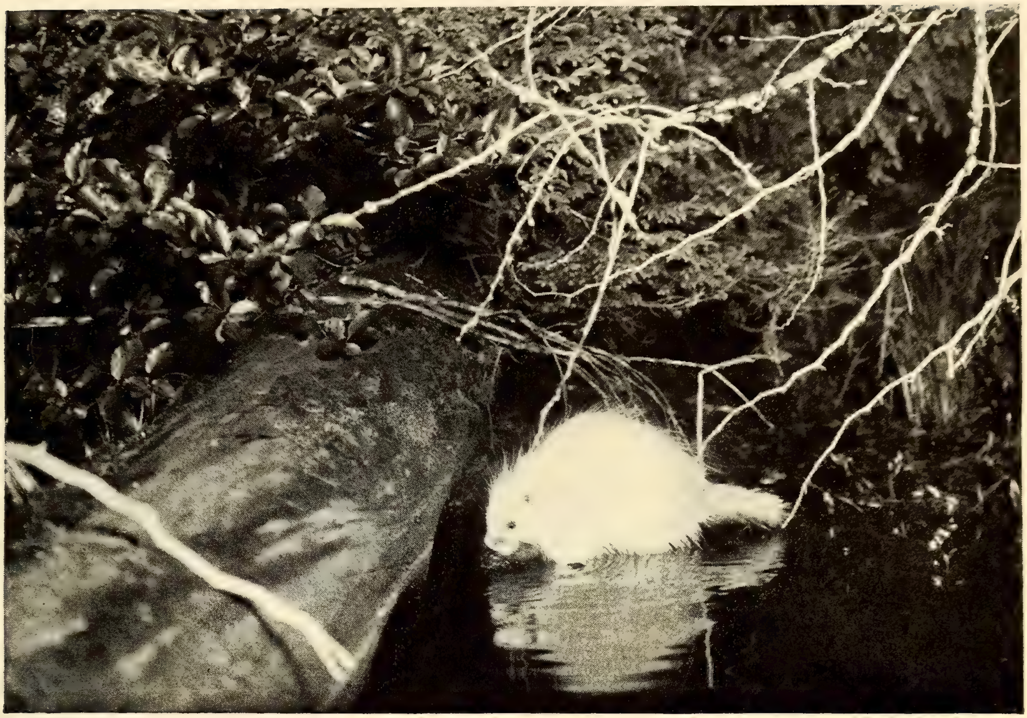
A NIGHT'S CAMP AT THE MOUTH OF DEAD RIVER

Being much impressed with the experiences of the first camp, three boy companions between the ages of nine and twelve were selected for a one night's visit to the mouth of Dead River, several miles north of town. The enterprise was to be undertaken without the assistance of guides or elders, so prone to interfere with the freedom of youth.

Marquette, like most early communities of the north, had no suburbs, and when one stepped out of the backyard, there began the domain of the wild, for the rigorous winters, deep snow, and lack of conveniences deterred any but Indians living outside the settlement.

Assisted up the beach by a one-horse wagon, the outfit was deposited beside a pyramidal rock where the river entered the lake, at which place there was plenty of drift-wood for a continuous camp-fire, axes being barred as well as guns, and, moreover, no one was to wade the shallow river on account of quicksands and because the pathless swamps and dense forests beyond were reported to be occupied by beasts having a particular preference for small boys.

The tent, when erected, leaned much to one side, in response to a crooked pole;



Photograph by George Shiras, 3d

FLASHLIGHT OF AN ALBINO PORCUPINE

For seven consecutive summers this animal was photographed at night in the same bay on Whitefish Lake. (See "A Flashlight Story of an Albino Porcupine and of a Cunning but Unfortunate Coon," June, 1911, NAT. GEOG. MAG.)

but this was deemed a virtue, according to one of the party, because the sagging canvas would keep our feet warm, the coverings consisting of a single blanket each.

COOKING UNDER DIFFICULTIES

The remaining part of the day was spent in fishing, and after the trout were cleaned and an indescribable batter prepared for the flapjacks, it was discovered the lard and butter had been left behind. But burned fish and flapjacks pried off the frying-pan with a knife were not discouraging, for there was an abundance of jam, bread and cookies, and in the tent was a large beefsteak for breakfast, which, in the absence of grease, would now be broiled on a spit before the fire.

As dusk approached, a roaring sound came from the interior and gradually grew louder. The suggestion that it was a great forest fire sweeping toward the lake and would soon engulf us nearly sent the party scampering home, but the absence of either smoke or flame seemed to upset this prediction, and the mystery was left unsolved.

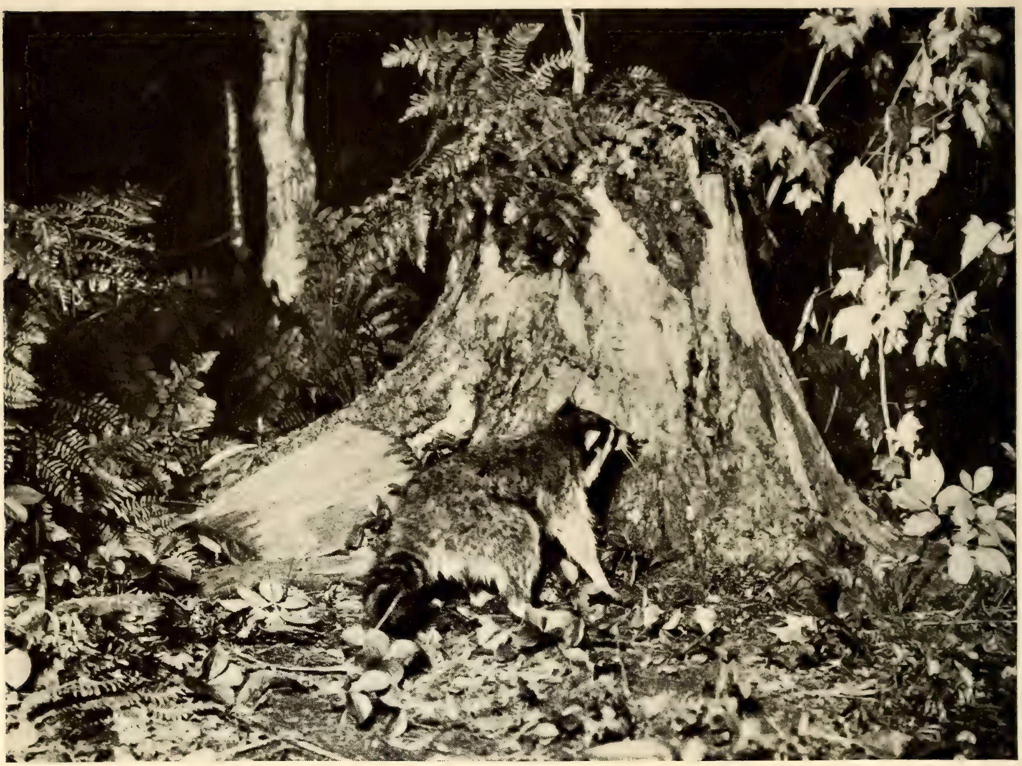
The wind, shifting from the lake to offshore, had brought in hearing the sound of some large falls; but such a simple explanation was not in the minds of youths about to spend the night in the region, growing more fearsome as the camp-fire accentuated the oncoming darkness.

It fell to my lot to occupy the front of the open tent, but as the warmth of the fire had advantages and the glare would keep away the prowlers of the night, I was soon asleep with the rest. About midnight the fire burned low, and to keep warm the blankets were drawn over the heads of each.

TERROR IN THE TENT

Suddenly I heard a snuffling sound beyond the tent, and then a couple of heavy feet pressed down on the blanket, followed by some animal seizing the package of meat and dragging it away.

Still enveloped in the covering, I man-



Photograph by George Shiras, 3d

A RACCOON FIRES THE FLASHLIGHT

Twenty-five years ago this omnivorous animal was unknown on Lake Superior, but on the coming of the second growth clearings and farming settlements it has taken up a permanent abode. (See "A Flashlight Story of an Albino Porcupine and of a Cunning but Unfortunate Coon," June, 1911, NAT. GEOG. MAG.)

aged to roll over the recumbent figures, shouting, "Bears! Bears!" until the closed end of the tent prevented further progress. Then there was a jumble of outcries and an effort made to occupy the same place in the rear, followed by the rapid firing of a revolver toward the opening by one of the party, who declared in excited tones that the prohibited weapon had been brought along for just such an occasion, for he knew we were in a country filled with dangerous animals.

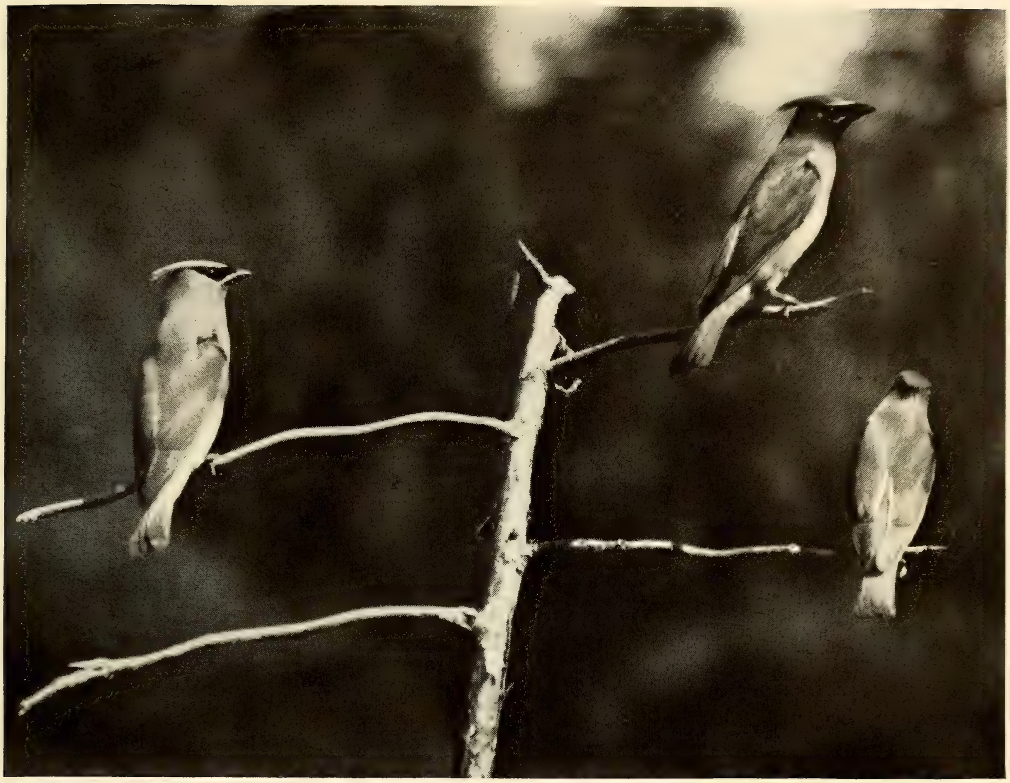
Under the protection of this weapon, the fire was replenished, and then at the edge of the swamp appeared the glowing eyes of wild creatures held at bay by the blazing logs, for the flittering fireflies above the moist ground were sufficiently realistic at this juncture to deceive all.

At daybreak the camp was abandoned, but not before large tracks were noted on the sandy beach. When each appeared at his respective home before any one had arisen, it was discouraging to be told that our visitor was, of course, only a stray Indian dog.

THE WORLD'S LARGEST CHARCOAL FURNACE

As showing how this particular camping place changed, it may be noted that the largest charcoal furnace in the world is now in operation on one side of the river, which is spanned by a steel bridge, and just beyond is the largest concrete ore dock on the Great Lakes, where leviathan freighters six or seven hundred feet long have replaced the birch-bark canoe. A shore driveway, with its multitude of automobiles, occupies the sand beach which once registered the tracks of many wild animals—and others not quite so wild, but equally fond of rare steak.

Early in August one of my youthful companions of the previous camp learned that two miles south of the town and



Photograph by George Shiras, 3d

CEDAR WAXWINGS NEAR THE CAMERA

In July, 1892, while watching for deer, cherry-birds were observed flying over the water after white millers. A stick with branches at right angles was placed near the blind and a camera, with a pulling string attached, was set up only three feet away from the perch. Soon a single bird was pictured; then two, and finally the three shown above.

several hundred yards above the mouth of Carp River was a salt lick much frequented by deer, for the valley beyond was a wilderness, visited only by a few trout fishermen early in the season. The animals came down the well-forested stream to the lick almost in sight of the highway following the lake shore.

Here, accompanied by a colored servant, he was placed on the top of a scaffold facing a salted log and within an hour had killed a deer, using a Martini-Henri carbine, the forerunner of the modern repeating rifle.

Then ensued great excitement among the boys of the neighborhood, and it was deemed a special honor when I was selected to try for a deer in company with the successful hunter, the exact location of the lick being unknown to the rest of us.

Several days later, on reaching the place, I found a high scaffold supported by four poplar trees and ascended by a rickety ladder, the general appearance indicating that it had been used as a convenient spot for killing deer by some one who found it unnecessary to go much beyond the town limits for his venison.

An old log had been bored full of auger-holes and filled with salt, so that each rain caused the salt water to overflow, keeping the lick continuously fresh. For about ten feet on each side of the log the trees had been removed, giving a full view of any animal standing in the opening.

A TRAGEDY AVERTED

By agreement I was to fire the shotgun first, followed by the carbine to insure getting the deer. Little time had passed when a twig cracked and both guns were trained on the log, ready for immediate action. Then a dark figure appeared and bent over the log, fortunately recognized, however, as a human being and evidently the proprietor, from the manner in which he examined the premises for signs of deer.

Had he looked skyward and seen the battery trained in his direction and the trembling fingers pressed against the triggers, he would doubtless have had some concern. However, he soon withdrew, and again we awaited expectantly, when, suddenly and without sound, a deer was seen standing on the opposite side of the log, with ears erect and nostrils twitching in an effort to detect any danger.

Counting three, the shotgun was fired, followed a moment later by my companion's, and then the animal whirled and was gone as silently as it came. Descending, we found that the deer had crossed the stream, and after trailing it some distance without finding any traces of blood, we returned much disappointed.

Just at dusk, on preparing to leave, a deer whistled near by, showing that so much tramping about the vicinity had given the needed warning. Much crestfallen and somewhat sensitive to my companion's declaration that had he shot first, there would have been a dead deer, I returned to town, wondering if such a favorable chance would ever occur again.

For more than fifteen years the State penitentiary, a huge brownstone building, has stood on the bank of the river just above where the lick was, and now some five hundred convicts gaze wistfully upon the still peaceful valley in which the unfettered creatures of the woods continue to roam.

THE DISCOVERY OF WHITEFISH LAKE

Several days later old Jack came shuffling along, looking for a job. When he heard of the unfortunate adventure with the deer, he told how he had discovered, two years before, a beautiful little lake away back in the unexplored forest, twenty miles east of his place, where deer were so abundant that one could be killed at any hour of the day or night.

Naturally, this excited my interest, and after further questioning I learned that in the summer of 1869 he had been employed as a mail-carrier by surveyors looking over a route for a railroad between Marquette and a point on Lake Michigan. When the preliminary survey reached a long, deep gorge, impracticable to bridge on account of the excessive cost, the project was given up.

Jack, however, noting the stream flowing through this valley and the possibility of finding good trapping ground for the ensuing winter, followed the gorge down until he came to a lake about a mile in length, where he saw many deer and much evidence of fur-bearers.

Later he built a half-way shelter at the head of Sand River and a larger one at the lake, where he had a season of successful trapping. Further, it was unnecessary in making this trip to carry anything but a couple of blankets, a gun, and a few provisions; for, besides the cooking outfit at both places, he had an abundance of maple sugar which could be used for tea or made into syrup for flapjacks.

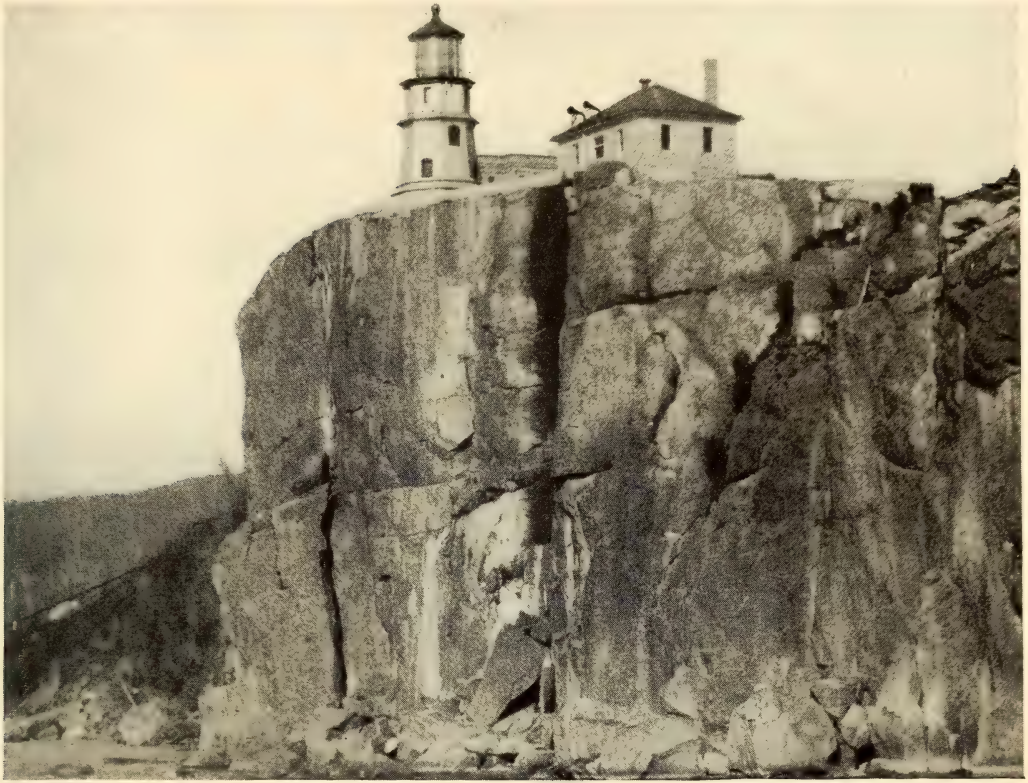
THE BEGINNING OF FIFTY YEARS' VISITS TO THE NEWLY FOUND LAKE

During the second week of August, 1871, with my young brother as a companion, we were driven in a buckboard to an Indian cabin ten miles to the south, near the Chocolay River, where an uncomfortable night was spent on the attic floor alongside several aged and ogresslike squaws.

After a hasty breakfast the packs were adjusted according to the strength of each, and a start was made on a fairly good trail to the river, after wading which the course was determined by trees blazed the year before. The direction was easterly along a maple ridge interspersed with hemlock, where absence of undergrowth made the traveling easy, the few swamps having deer trails that avoided all mud-holes and fallen timber.

At noon the headwater of Sand River was reached, where the little lean-to of Jack's was to be occupied that night. The packs, light as they were, had told on the two very youthful members of the party.

While the lunch was being prepared, the sight of the little stream suggested trout, and much to the surprise of Jack we soon caught a dozen small fish. Like most Indians, Jack had a rather hazy notion about trout fishing in interior waters, since Lake Superior, filled with



Photograph by George Shiras, 3d

A MINNESOTA CONTRIBUTION TO THE SCENIC SHORES OF LAKE SUPERIOR

Minnesota, by reason of its climate, its woodlands and prairies, its countless beautiful lakes and connecting waters, has long been a paradise for wild life and a mecca for the sportsman and tourist. Owing to wise laws and a most efficient game commission, it stands in the forefront of progressive States. At some future time it is the purpose of this Magazine to portray at greater length the out-of-doors attractions of this commonwealth.

whitefish, lake and speckled trout, afforded such an ample and easily obtained supply by the use of the net, that the Indians rarely resorted to the rod.

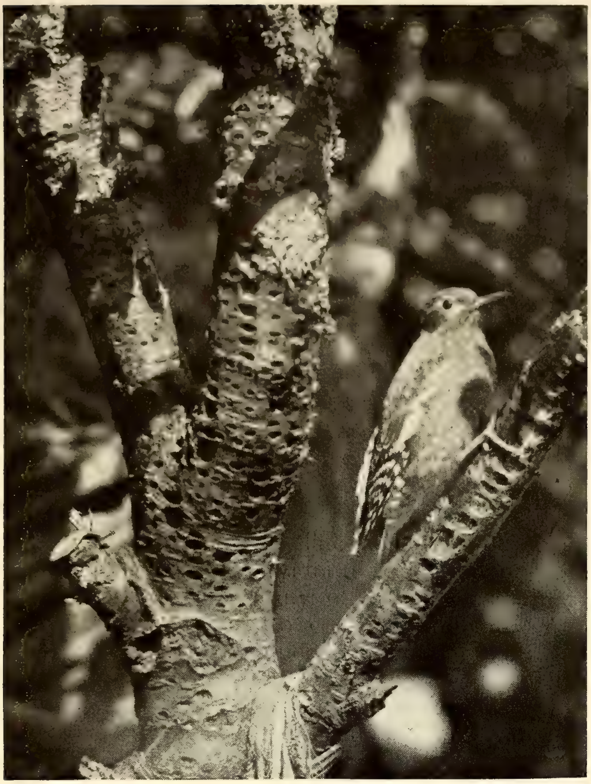
After the meal the possibility of maple sugar led to a search, when Jack, suspecting what we were after, lifted a heavy, flat stone from the edge of the shelter, exposing a tin can filled with pulverized sugar, the treasure being thus concealed because Bruin had a sweet tooth and otherwise would soon have detected this little store.

A STRANGE NOISE FROM THE WILDERNESS

Toward evening a strange noise came from down the stream, a confusion of bawls and whimpers, which Jack announced as the family bickering of an old she-bear and cubs. Seizing the shotgun, I announced a preference for bears and suggested that we proceed accordingly. Jack grimly rolled up a shirt sleeve, exposing a shriveled arm, deeply scarred, which he said was the result of a fierce encounter with a bear ten years before, and since he was responsible for our welfare, the bear hunt was off on this particular occasion.

Not until many years afterward did I learn how uniformly harmless was the black bear, even with cubs, and that Jack's misadventure was due to falling on top of a big bear asleep between two logs, and in an endeavor to escape the animal had seized him by the arm under the very natural impression that any one taking such liberties should be repelled by force.

Little time was lost in starting the next morning along a blazed trail leading to higher ground, through which an occasional glimpse of Lake Superior could



Photograph by George Shiras, 3d

YELLOW-BELLIED SAPSUCKER PUNCTURING A MOUNTAIN ASH

Many insects are attracted by the sweet fluid, furnishing food and a potion to the feathered proprietor.

be had an uncertain number of miles away.

In the final mile or so many deer runways were seen, all converging into larger ones leading toward the lake and each filled with fresh tracks of varying sizes.

Silence was suggested with a view to getting a shot, but Jack said that this was exactly what he was trying to avoid, as a deer killed away from camp meant delay and an unnecessary burden, and so he kept up a continuous chatter.

TYPE OF SHELTER THAT WAS OFTEN USED

At length a small clearing ahead indicated our goal, in the center of which appeared a type of shelter I had occasion to use in later years. It was shaped like a good-sized wall tent, having a narrow opening in the roof for the escape of smoke, with side walls of cedar logs extending up four feet and a double pitched roof of black ash bark.

There probably does not exist a more durable, waterproof, and easily prepared covering for a wilderness camp than black ash bark. The bark is removed from the trunks of the larger trees without difficulty in the spring, cut into sheets four by six feet, and put on, slightly overlapping. The sheets are supported beneath by cross-poles, while cedar strips along the outer surface prevent them from curling.

To one viewing the interior for the first time, the rich dark brown of the inner bark might be taken for a covering of well-tanned cowhides.

The birch bark in use for most Indian tepees along Lake Superior cannot be found in any virgin Michigan forests, for it is a second-growth tree in this region, as is generally the case elsewhere. Being inflammable and of a flimsy character, birch bark is not to be compared with the bark of the ash.

THE FIRST GLIMPSE OF WHITEFISH LAKE

On depositing our packs we were naturally eager to see the lake, lying concealed at the foot of the hill a few hundred yards away; but Jack declared the first thing in order was a meal, then the cutting of balsam boughs for the beds, ample firewood, and a general overhauling of the camp before the lake could be visited.

Finally all these preliminaries were over and we started down a steep slope for a body of water which, according to Jack, had been unvisited by any white man since the days of the Hudson Bay trappers, a hundred years before.

Interested as we were, could I then have anticipated what an all-controlling factor this little body of water was to play in the writer's destiny and that of his family, it would have been a much more memorable day.

A glance to the north disclosed a narrow lake about a mile long, heavily forested with pine and hemlock except at the end, where a semicircular growth of reeds backed by cedars and black ash indicated an outlet stream.

A look to the south disclosed a beautiful slough between high hills, and at the end reeds, water lilies, and sand beaches, through which ran the inlet stream, showing a gorge filled, as far as vision reached, with stately elms, beneath which grew the ever-present alders.

The view on page 192 shows the slough looking toward the lake, which is somewhat obstructed by a point, and on page 134 is the valley down which Jack came when he discovered the lake.

THE CENTER OF THE DEER COUNTRY

In this little slough and the adjacent lands the time was to come when more deer would be killed by market hunters and sportsmen than in any tract very much larger on the American continent, and, what can be stated with more pleasure, it was in this locality that the new sport of hunting with the camera was to be originated, and where more deer were to be photographed by day and by night than elsewhere throughout their entire range.

This was the center of the deer country. Several natural salt licks were located beneath each bank, forming the central points of century-old gathering places of all the deer within a radius of ten or fifteen miles. Here, at any time between spring and early winter, they could be seen almost continuously.

At the time of our first visit none of us knew of this unusual attraction, for from where we stood it was impossible to see the animals close to the bank, and it was not until years later that the muddy and trampled surface and the sight of the deer gulping down this saline mixture indicated the presence of mineral springs, shown by analysis to contain a higher percentage of salt than many of the commercial salt wells in southern Michigan.

While we were intent on noting the surroundings, Jack pulled from beneath the alders what looked like a log, but when turned over proved to be a dugout made from white pine and containing a paddle and a gill-net.

Although made for only one person and used for trapping, we were all such light weights the boat was deemed large enough to carry two of us when hunting.

Jack soon made another paddle from a dry piece of cedar, and then, according to the rules of primogeniture, I was to go on the first hunt, the lower end of the lake being selected. Before starting, I asked why the slough, with its many runways, was not the best place to watch, and was told that this locality was reserved for fire-hunting that night, in case we had no success in getting one before dark.

Leaving my brother to find his way back to camp, we paddled slowly along the western shore toward the reeds and shallow waters, where Jack predicted it would take but a few minutes to get a deer.

Suddenly he whispered, "Put up your paddle. There is a deer ahead."

But I could neither see nor hear one. Passing some reeds bordering a little bay, I saw, standing within less than thirty yards, a small buck, intent on obtaining the succulent water grasses growing a few inches below the surface.

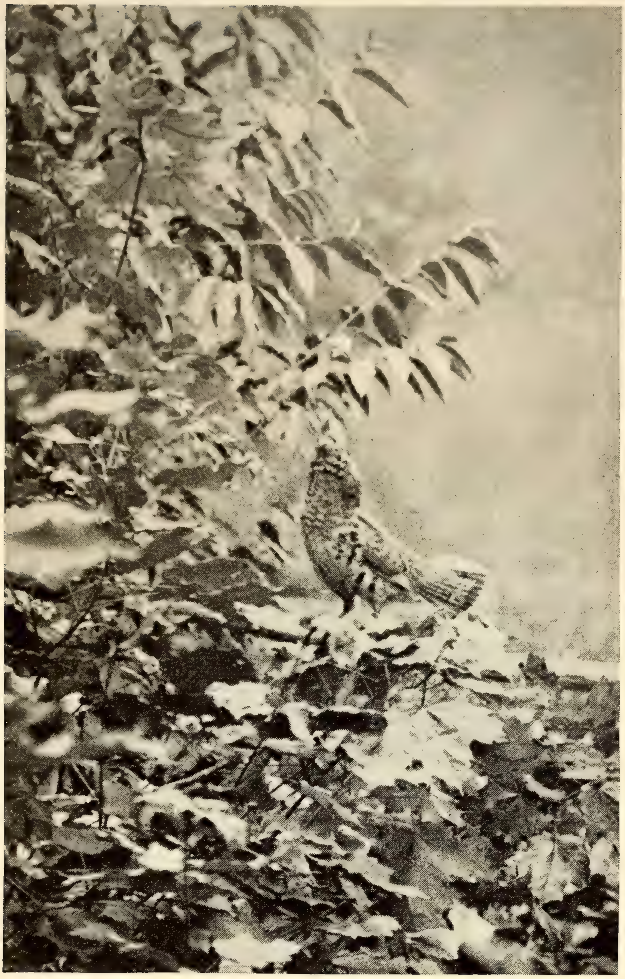
THE FIRST SHOT

Silently I raised the gun, aimed for the shoulder, and as the black smoke and heavy report evidenced the pulling of the trigger, the deer gave a spasmodic whirl, rushing toward the shore at an extraordinary speed, the water flying in all directions. Once more the gun was discharged, just as the animal, in a single leap, cleared the bushes and disappeared in the cedar brush beyond.

Reverberating echoes from the high ground across the lake did not conceal Jack's chuckle; but he gave assurance of another shot within an hour.

"Another shot!" What a mockery this seemed to one who felt sure that this time the effort had been successful; and, if not, what chance would there ever be of doing better? Therefore, with assumed confidence, I insisted that we would find the deer dead within a short distance. But Jack only laughed and steered the boat toward the opposite shore, for it was evidently his opinion that "buck fever" had given this animal a further lease of life.

After several hours had passed with-



Photograph by George Shiras, 3d

AN ANCESTRAL RUFFED GROUSE

In the fall of 1892, on approaching the author's camp clearing, a cock grouse, clucking and spreading its tail on a branch beneath a wild cherry tree, was pictured with a small hand camera.

out our seeing anything further, we returned to camp, and, following supper, preparations were made for fire-hunting, under the primitive conditions employed by the Indians, it now being my brother's opportunity to provide the venison.

At dusk we went down the winding trail, illuminated by a flaming torch of birch bark from material brought in for this purpose. Placing an old frying-pan in the bow of the dugout, containing a handful of pine knots, with strips of bark near by, to be added when more light was needed, a start was made, and I returned to the camp, which was hardly reached before there came the crack of the gun.

THE AUTHOR'S BROTHER GETS HIS DEER

After a while the glare of the approaching torch showed Jack leading the way, carrying several pickerel taken from the net at the entrance of the slough, while my brother had the gun in one hand and in the other a stick upon which were impaled the heart and liver of the deer, showing the success of the hunt.

Then came the account of the dugout passing along the slough, when the sound of several deer trampling about in the mud led to the turning of the canoe in that direction, where two pairs of shining eyeballs indicated a choice of victims. When about fifty feet away the luminous eyeballs disappeared and the two animals could be seen looking across the water. Selecting the smaller of the two, it went down without a struggle, and at the landing it was soon dressed and hung up that it might be drained of blood.

During the night I resolved to arise at daybreak and, without disturbing the others, seek the place where my deer had gone ashore, with the vague hope of finding it or, if unsuccessful, to try for another animal single-handed.

THE QUARRY FOUND!

Never having paddled in the stern before, a few strokes were taken on one side and then on the other, and in this slow and clumsy fashion the bay was reached. Here the dried mud on the leaves gave the clue; so, pushing the bow of the boat into the bushes, I leaped clear of the muddy edge, seizing a projecting snag for support. But the snag proved to be the hind leg of my deer!

Sinking down, trembling with emotion, I eyed the crumpled body of the little buck. Had a humanitarian witnessed the scene it might have looked like contrition over the destruction of a beautiful and innocent creature, but the time had not yet come when the camera was to be substituted for the gun in my big-game hunting.

After recovering somewhat, an examination showed that nine buckshot had passed entirely through the body, piercing both heart and lungs, thus giving an illustration of how far a deer will occasionally run when mortally wounded. But unknown then was the fact that most deer indicate by their actions the effect of a shot; for when missed they bound away gracefully, with the head erect and the white tail aloft, as though giving a farewell salute to the disappointed hunter, whereas on receiving a deadly wound they usually run rapidly instead of bounding, with the head lowered and the tail down, wringing it spasmodically from side to side. To the inexperienced hunter it is, therefore, of prime importance that he note carefully the action of the animal after a shot.

In dragging my deer through the bushes the stiffened limbs caught, and a heavier pull landed the hunter and the animal in the deep mud, making it a difficult task to get the bedraggled trophy aboard.

On nearing the end of the lake, my triumphant shouts aroused the sleepers, who hurried down the hill in the belief that the strangely absent member had gotten into some kind of trouble. But the sight of the dugout and its muddy occupants told the story of the clandestine and successful trip.

THE DEER MEAT WAS CAREFULLY CURED

During the day the meat of the two deer was partly dried in strips before a hardwood fire, and the day following this task was completed, so reducing the weight of the carcasses that all the edible portions were carried home—a lesson in conservation never lost. In later years I was to witness millions of pounds of meat left in the woods each fall by wasteful market hunters, who shipped out only the saddles, leaving the remainder to rot.

During the succeeding ten years, this trip was repeated often, being made each way in a single day, extra packers accompanying the hunters, so no meat would

GROUSE DOZING IN THE SUN

Crop filled with mountain-ash berries. A two-years' closed season, 1918-19, increased these birds beyond any previous numbers (see page 150).

Photographs by George Shiras, 3d

GROUSE IN MOUNTAIN-ASH TREE

On October 1, 1920, the opening day of the hunting season, several grouse were seen feeding on mountain-ash berries and their pictures were taken before a hunter appeared.

be wasted. Finally, in 1881, a railroad was constructed between Marquette and Sault Ste. Marie, passing half-way between Lake Superior and the camp, making it readily accessible (see pp. 188-9).

As I write, the fiftieth consecutive year has passed, during which longer and more frequent visits have been made, many of them recorded in subsequent pages. Seldom has a wilderness camp in this country retained its primitive attractions of forest and wild life so long. During this time many States, then unorganized in the West, have lost a large share of their once abundant game.

CHAPTER III

THE WHITE-TAIL DEER

The white-tail or Virginia deer has a wider distribution on the continent than any other antlered animal, and is likely to continue indefinitely, in many places increasing under suitable laws, aided by its wonderful capacity to adapt itself to changing conditions. It is the favorite big-game animal among sportsmen of America, for the meat is palatable, the antlers symmetrical and attractive, while its cunning becomes an additional incentive to those whose real enjoyment lies in the exercise of skill and persistence in hunting.

Animals like the moose and elk are seldom killed by sportsmen after one or two sets of antlers have been secured; for the great bulk of these animals, the difficulty in saving the meat in remote places, and the ease with which they are shot deters annual hunting, whereas the white-tail, much less in weight and usually within reach of transportation, is sometimes hunted by a sportsman for thirty or forty consecutive years.

While the writer has had an extended experience with various species of white-tails throughout most of the range of this group of deer, from Central America to near its northern limits, the present narrative is confined to those of the Lake Superior region.

The white-tail, while now quite abundant, was unknown on the north shore at the time the writer came to the region, in 1870. Moreover, there were few within a mile of the south shore, due largely to the ever-present Ojibways, so aptly called "Canoe Indians," who during the summer camped at the mouths of nearly all streams and other places apt to be frequented by deer.

DEER SPENT SUMMERS NEAR LAKE SUPERIOR

But when the country to the south began to be settled most of the deer spent the summers near Lake Superior, stopping first about the small interior lakes and headwaters of the numerous streams where the Indians seldom went before winter.

The writer's early visits to Whitefish Lake illustrated these conditions. The fact that approximately eighty thousand deer were killed each year of 1879, 1880, and 1881, and most of these within ten miles of Lake Superior, shows their extraordinary increase later. Since that time there has been a gradual and steady decline, largely on account of the great increase in hunters and the convenient method of reaching places previously inaccessible.

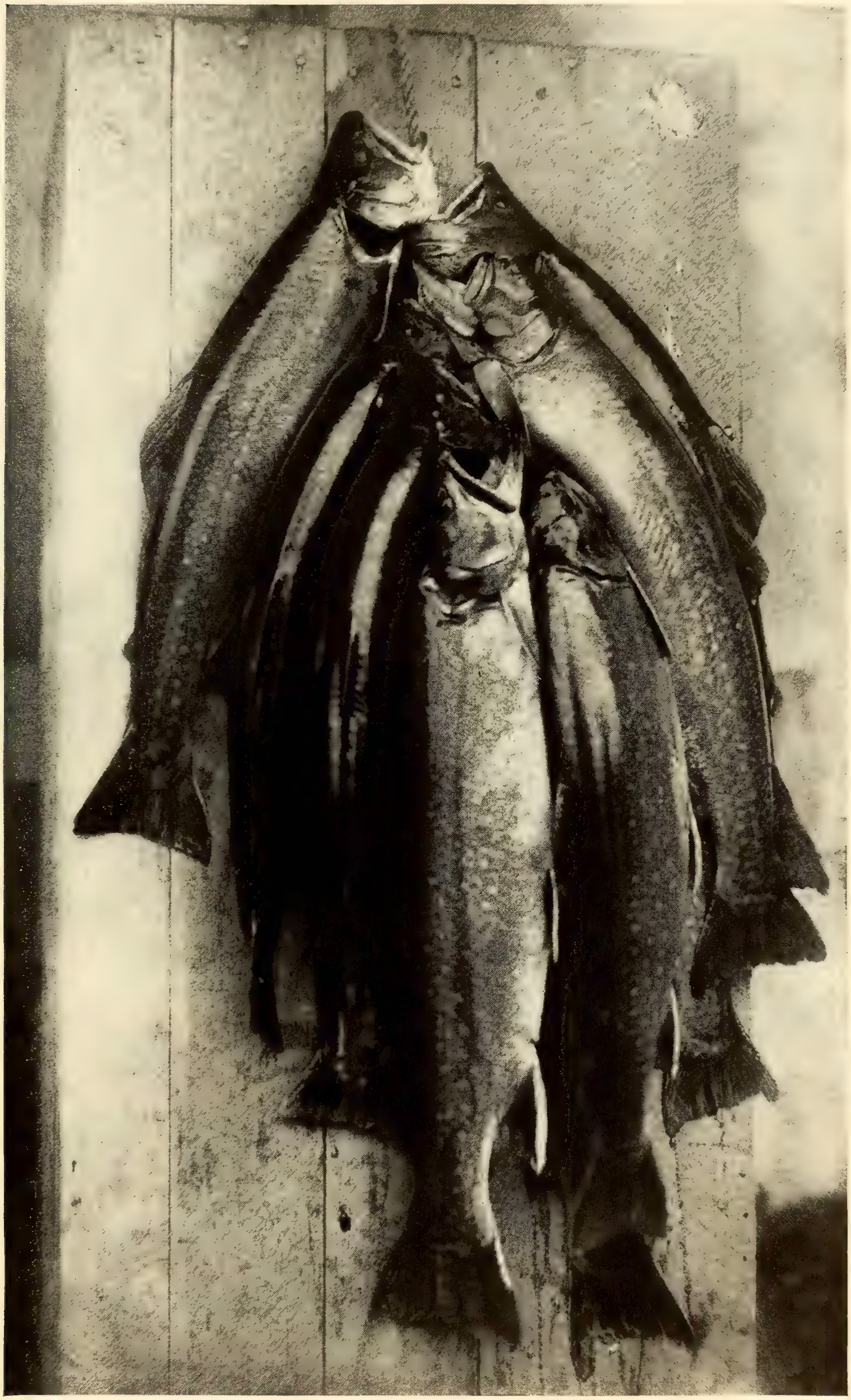
Every summer and fall, I spent a portion of each week at least with young companions camping on the south shore, traveling usually in a big, staunch rowboat, with a canoe often in tow. Trout fishing was of the best along the open waters, many of the fish being of great size. In the streams were brook trout, so often preferable for the frying-pan, while wild pigeons frequented the burnt-over clearings near the shore, unprotected by law at that time. Grouse were numerous in the same localities.

Whenever the camp was near a small lake, the canoe was carried over, and during the day a deer could generally be killed.

In the course of time all the well-wooded bays and sheltered points for more than a hundred and fifty miles were visited, including each lake and pond and every stream where fish or game abounded.

HEAVY GALES UNKNOWN ON LAKE SUPERIOR

In this long period only once or twice was the party windbound for more than a day and at no time in the slightest peril from wind or waves, showing that this, the greatest of all lakes, is peaceful and dependable beyond compare.



A FINE STRING OF SPECKLED TROUT

Catches such as the above were not unusual in Lake Superior prior to 1885. Average of above fish was 4½ pounds. Fishing in the mouths of all the spawning streams during the month of August accounts for the great decline in numbers (see page 155).

Heavy gales can neither continue nor develop on Lake Superior, as shown by the fact that the maximum wind velocities seldom exceed 40 miles an hour. Not only is this remarkable record in striking contrast to the tornadoes of the Middle West and the hurricanes frequently reaching the Atlantic coast, but likewise in the case of many populous communities.

Here the Weather Bureau figures confirm the writer's conclusions. During a five-year period (1911-1915) the wind on 156 days reached or exceeded 40 miles per hour at Duluth, and in the same period a similar velocity was reached only 21 times at Houghton, 46 at Marquette, and 33 at Sault Ste. Marie, showing that the heavier winds subsided when they reached the lake, and that this vast area of water, instead of breeding gales or accelerating the land winds, had the opposite effect.

Moreover, the heaviest wind at Duluth in 47 years (1873-1920) was 78 miles per hour, in September, 1881, and this was very exceptional, while the highest velocity at this period for Houghton was 60 miles; Marquette, 62, and Sault Ste. Marie, 61—substantial proof that Lake Superior is free from heavy gales. Contrast such a record with the following stations, many of which cover a lesser period:

Mobile, Ala., 115; Buffalo, N. Y., 96; Mount Weather, Va., 110; Charleston, S. C., 96; New York, N. Y., 96; Fort Canby, Wash, 104; Hatteras, N. C., 105; Pensacola, Fla., 120; Key West, Fla., 115; St. Paul, Minn., 102; North Platte, Nebr., 96; Galveston, Texas, 94; Kitty Hawk, N. C., 100; Point Reyes, Calif., 120.

SHIPWRECKS ARE ALMOST UNKNOWN

However, when moderate winds prevail for several days along or across this vast body of water, one may see, under blue skies, great white-capped rollers dashing against the black volcanic rocks or surging high up on the beaches; but no reasonably staunch passenger steamer has ever been sunk on Lake Superior by reason of wind or waves, though occassionally some of the large freight carriers, when the shore and reefs are shrouded in a fall snow-storm, have been wrecked within the narrowing outlet of the lake; and again, on very rare occasions, an ore-boat, with decks awash, carrying an immense tonnage in its long, steel hull, has developed a structural weakness in a rolling sea and gone like a plummet to the bottom.

Loss of life in launches, sail-boats, or lighter craft has been negligible, and it is doubtless true that on many a small, interior lake or tidal bay there have been more casualties in a single season than during a century on Lake Superior.

MARKET HUNTERS KILLED 150 DEER A SEASON

Other trips were often made into the interior, where chains of lakes offered a change of scenery and of methods of hunting, including always a visit to a little camp near Whitefish Lake. The experiences gained in such widely separated parts of the region were later much enhanced when the camera allowed a longer and better opportunity for studying wild life.

The market hunters seldom killed less than a hundred and fifty deer a season. One hunter happened to locate his camp a few miles south of Whitefish Lake, where almost as regularly as the clock a horse in charge of an assistant passed each morning loaded with saddles of venison, to be shipped by express to Detroit or Chicago, while the remainder of the carcasses were left to rot.

This slaughter in the neighborhood continued for five seasons, with an estimated total of over four hundred deer to one gun. Then a ban was placed on the sale of venison and the killing fell off for a while.

When reference is made to the seasonal migration of wild creatures, we usually have in mind a large class of birds which every year go to and return from the breeding grounds in the north. Certain fish, like the salmon and shad, are migratory, as is the fur-seal and also some insects, including certain butterflies, but among the game mammals of our continent only the buffalo and caribou may be regarded as true migrants.

However, some species of the deer family, such as the elk and mule deer of the Rockies and the moose of Alaska, ascend regularly in the spring to higher

Photograph by George Shiras, 3d

TIMBER WOLVES POISONED ON WHITEFISH LAKE

Next to man, these animals are the most destructive foe of the white-tail deer in the upper lake region. Fourteen years ago, during a severe winter, when deep snows were crusted for several weeks, the wolves destroyed nearly all the deer within a ten-mile radius of Whitefish Lake. From the carcasses found it was estimated that over two thousand deer were killed in this limited area. A deer's fear of a wolf is only equalled by a wolf's fear of man (see pages 160-166).

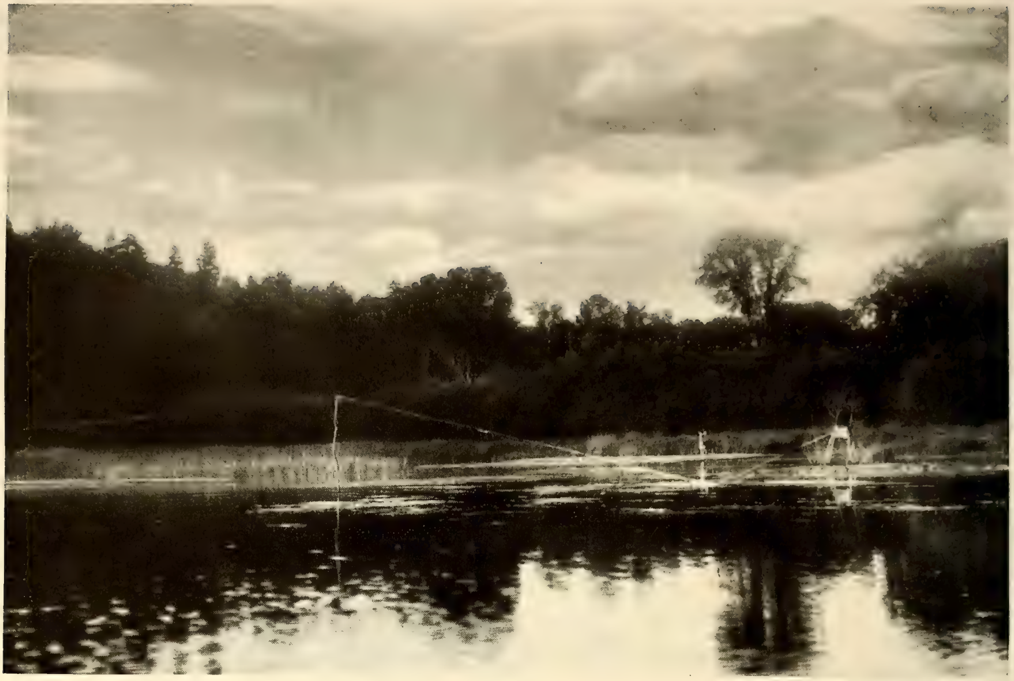
grounds for better food or to escape insect pests, returning again when deep snows or killing frosts make the lowlands preferable.

But such movements, though well defined and participated in by hundreds and sometimes thousands of animals, are altitudinal and not latitudinal, and therefore not deemed migratory in the accepted sense, because they may travel to the north, east, or west in their ascent or descent each year, and this usually occurs when retreating or increasing snows regulate their movements.

With the true migrant the condition of the prevailing temperature, either in the spring or fall, has little to do with the migration, however much it was the original cause, for birds of many species travel at about the same periods each year, regardless of any then-compelling necessity.

DEER CHANGE THEIR MIGRATION HABITS

On the south shore of Lake Superior, including all of northern Michigan and Wisconsin, there once existed a spring and fall movement of the white-tail deer which possessed all the characteristics of a true migration. As this habit was abandoned more than thirty-five years ago, after continuing, doubtless, for centuries, it is worthy of record, especially in view of the fact that those who were



Photograph by George Shiras, 3d

WHERE ANIMAL FLASHLIGHT PHOTOGRAPHY HAD ITS BIRTH: THE SLOUGH AT THE END OF WHITEFISH LAKE

In this small area more deer were killed, and later more photographed by day and by night, than in any similar locality on the continent. Natural salt licks were one of the attractions. This picture shows the method of taking daylight pictures by means of a string running from a seat in a tree to a camera on the beach. Whenever a deer was passing within range of the camera a sharp whistle stopped it, and then a pull on the string recorded the scene. A number of such pictures appeared in the NATIONAL GEOGRAPHIC MAGAZINE for July, 1906. The figure of a deer may be discerned in the background.

familiar with it are fast departing or have never understood the unusual character of this migration when compared with the habits of the white-tail in its other widely separated ranges.

Early in May, as soon as the depth of the snow permitted travel, thousands of does worked their way north, traveling alone into a broad belt along the south shore of Lake Superior, where a few weeks later the fawns were born. The bucks came more leisurely, but by early June the migration was over.

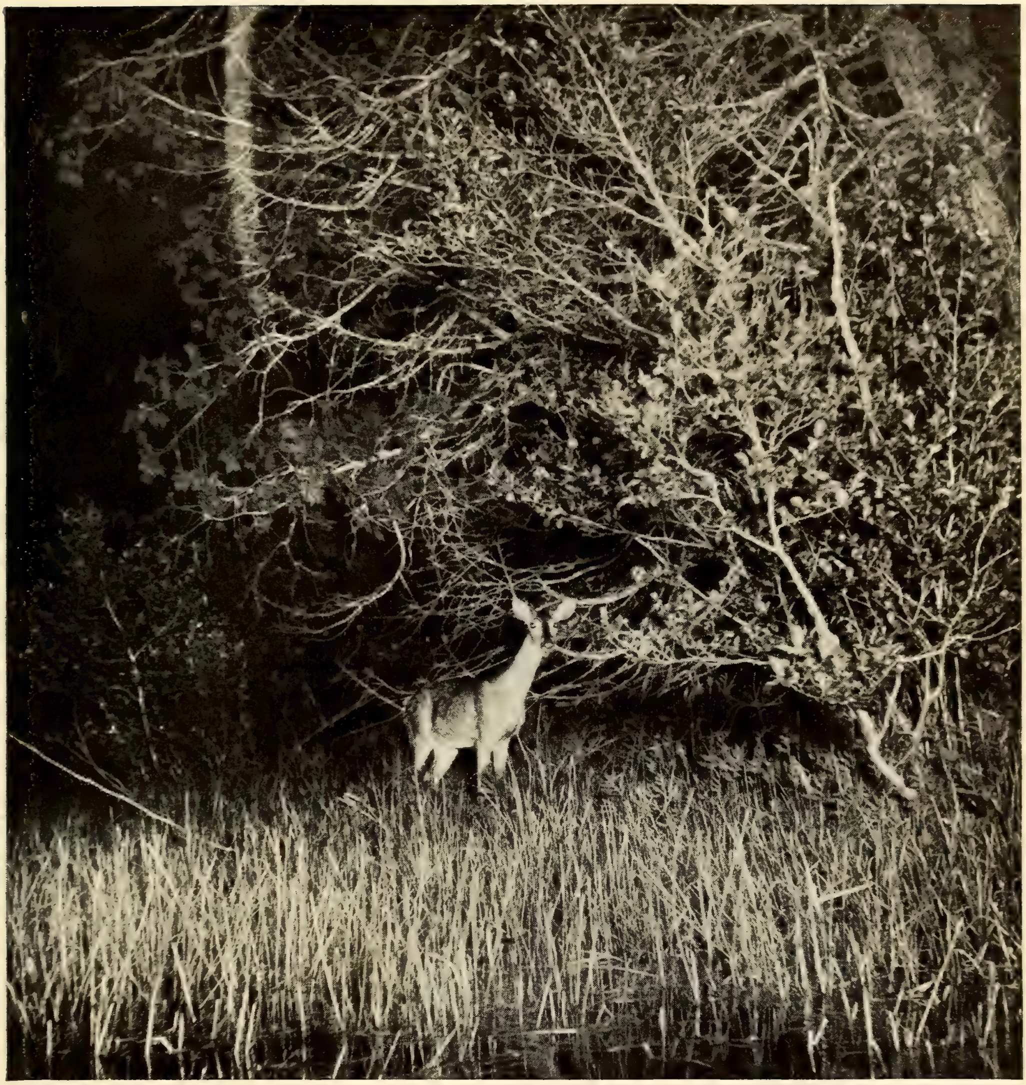
On the coming of the first heavy north winds, accompanied by a light frost, sometimes as early as August 15, the does, fawns, and yearlings started south, and by September thousands were on their way, regardless of the fact that no snow would fall for six weeks and none deep enough to interfere with the food supply or freedom of movement for more than three months later.

In October most of the bucks had gone, and I well remember my old guide, Jake Brown, who for many years wintered in the vicinity of my camp, telling me, on more than one occasion, that if he "didn't get his venison under the snow by Thanksgiving Day" he "would not have a chance again before the middle of May."

In a few instances it was known that deer yarded, trying to winter near the lake; but they were promptly killed, either by the wolves or the Indians.

SNOW MAY HAVE CAUSED ORIGINAL MIGRATION

Doubtless the great depth of snow in this region was the original cause of their fall migration, until it had finally become so fixed by inheritance that long before there was any apparent necessity the retirement took place. In twos and threes they traveled southerly on many trails



Photograph by George Shiras, 3d

THE FIRST SUCCESSFUL FLASHLIGHT OF A WILD ANIMAL EVER MADE

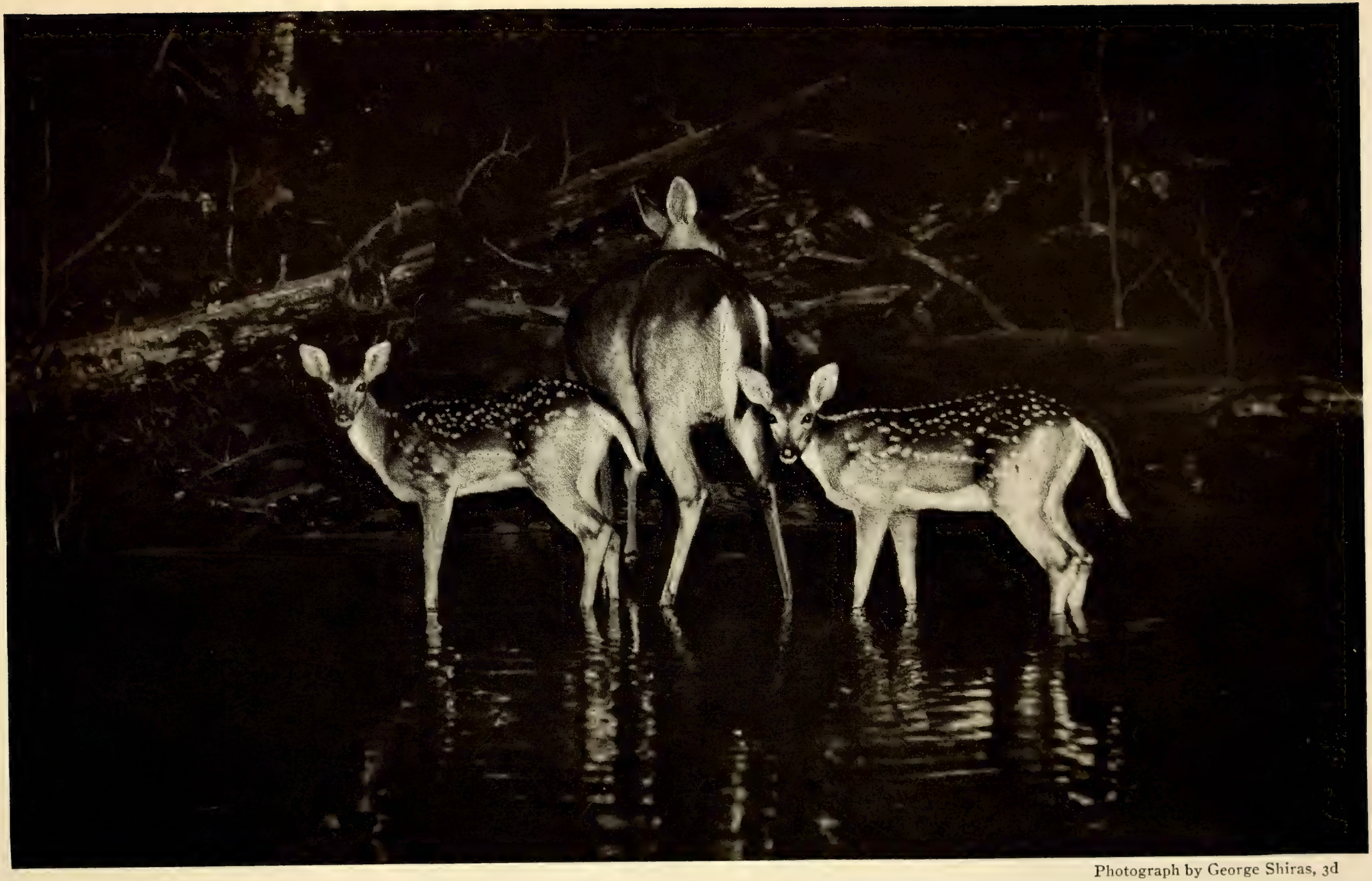
This yearling buck, with head erect and facing the jack-light, was the first satisfactory subject for a picture obtained by the author in his invention and development of night photography (see pages 175-176).

which by centuries of use had become about two feet broad, clear of obstructions and deeply cut in banks and soft ground. In swamps they were like caribou trails in Newfoundland.

These migrating deer always traveled with the wind and never against it, and always in the daytime, usually between 7 and 4 o'clock. It is interesting to note how this compared with the migration of the caribou in Newfoundland, where I spent two seasons studying it. There, too, the cows, calves, and yearlings began moving south about the 15th of August, but usually in bands of a dozen or more, followed by the large stags later, and, like the deer, they traveled in the daytime, but always against the wind except during severe weather, at the end of the season.

THE CARIBOU DEPENDS ON SCENT

It is characteristic of the caribou to depend upon scent rather than sight or hearing, and this is especially true of the Woodland caribou of Newfoundland, which,



Photograph by George Shiras, 3d

"INNOCENTS ABROAD"

A flashlight photograph of a doe and her twin fawns, taken from a canoe, on the eastern shore of Whitefish Lake, nearly thirty years ago. This picture, with the frontispiece and the two on pages 138-139, were the first to indicate the possibilities of the camera at night. The group mentioned was exhibited by the United States Government at the World's Fair, Paris, 1900, receiving the Gold Medal, and at the World's Fair, St. Louis, 1904, receiving the Grand Prize.

migrating south in bands, have learned, through generations of experience in this oldest of English colonies, that danger always lies ahead; for concealed along the line of the trans-island railroad or in the passageways between numerous lakes are hundreds of hunters, mostly erstwhile fishermen, out for their winter's meat, with here and there an English or American sportsman in search of an antlered trophy. Headed against the wind and in a more or less open country, the telltale scent gives warning a long distance in advance.

On the other hand, the white-tail deer, traveling south alone or with the offspring of the year, moving steadily, but cautiously through a wooded country, always depend upon the eye or ear for any danger in front, and, coming down the wind along nearly straight runways, are able to scent any foe approaching from the rear, be it man or wolf.

DEER EASILY SHOT AT THE RAILROAD CROSSING

My first information concerning this migration came shortly after reaching Lake Superior. On several occasions one of my hunting companions spoke of the annual visits each fall of his father and several friends to certain localities on the Northwestern Railroad between Negaunee and Escanaba, some thirty miles south of the town, where the deer crossed the tracks in large numbers on the coming of the first cold north winds.

The members of this party were more interested in fly fishing, but found it possible to shoot all the deer they wanted in a few days each fall, since they presented easy shots on crossing the track and could be transported all the way back by rail.

In 1874 I was asked to join this party, leaving when the wind turned to the north, about the middle of August, for in those days the hunting season opened on or before this date.

The camp was located behind a sand-dune at a station called Helena, where there was nothing to dignify its name except a switch and a section-house half a mile farther east. At this point the railroad cut through a number of hardwood ridges, with open and nearly dry swamps between them.

Some of the deer followed large runways in the timber, crossing the track where there were deep cuts, and others came at a trot through the swamps, where often they could be seen at a considerable distance. The hunting was almost equally good for forty miles, most of these deer passing between Little Lake and Maple Ridge, coming from that portion of Lake Superior between Marquette and the Pictured Rocks, points indicated on the map (page 114). A similar migration occurred west of Marquette and throughout northern Wisconsin.

SAVING A QUARRY FROM THE TRAIN

On the first hunt I was placed on the south side of the track at a deep cut, where a deer had to come down one bank and up the other; so I was advised to wait until it was crossing the track, when I would have a better chance.

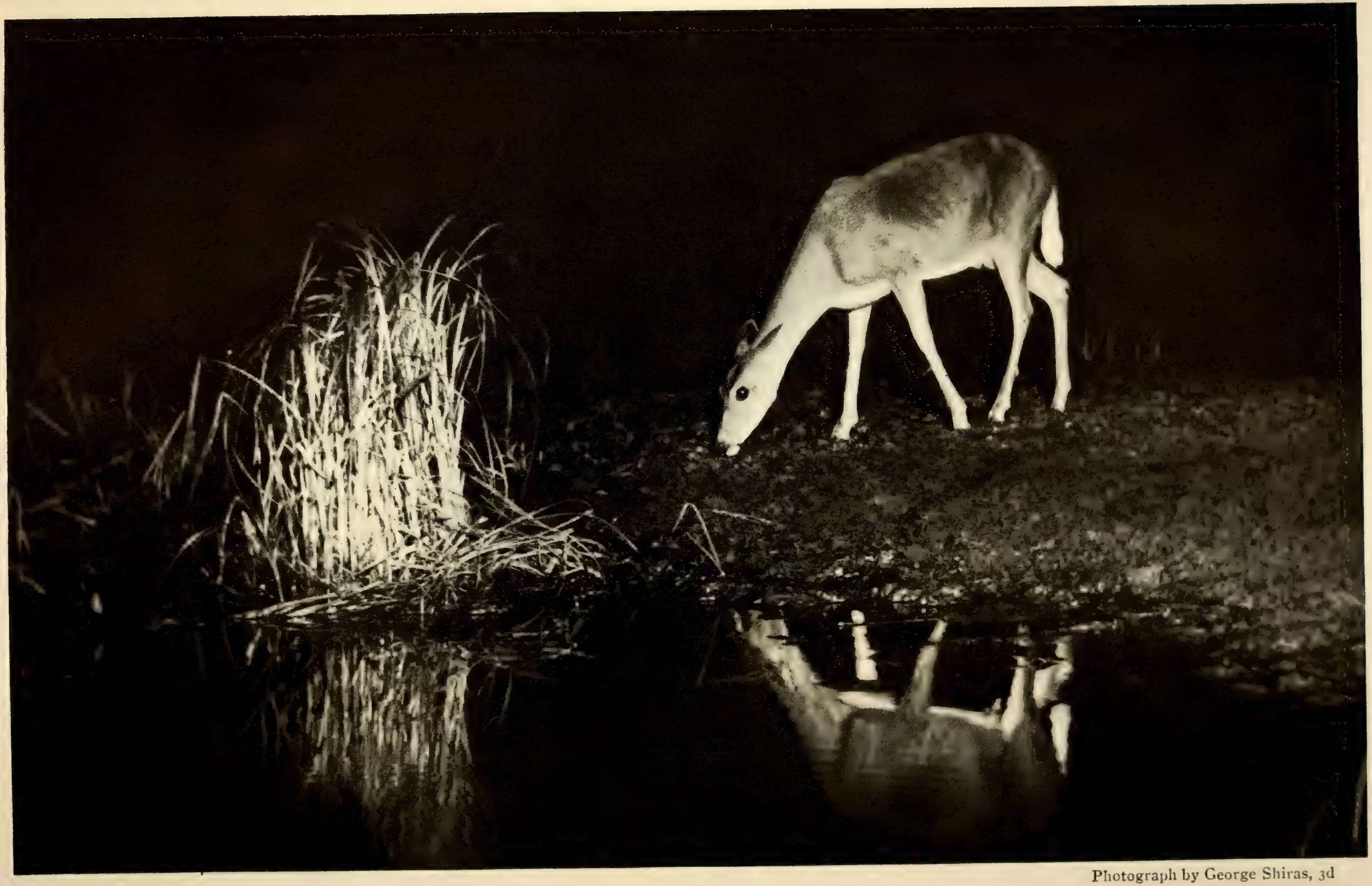
I had been concealed in the little brush blind about half an hour when, diagonally up the track, I saw a deer come out of the forest and stand on a bank cleared of brush. Remembering the instructions, I waited with considerable anxiety for it to advance. Just then could be heard the rumble of an approaching train bound west, with empty ore cars for the mines, and the deer, too, noticing the sound, evidently hesitated to advance.

After a minute's delay it seemed certain the animal would turn back, for the train was in sight, less than a quarter of a mile away. So, taking careful aim, I fired. The deer, giving a tremendous jump, toppled over the bank, lying with its head and shoulders across the track. Seeing it would take quick action to reach the animal before the train mutilated it, I hurried, arriving none too soon, for the heavy engine passed just as the deer was pulled aside, the engineer excitedly waving his cap by way of congratulation.

A SURPRISED HUNTER

On one of the fall camps at Helena the wind shifted to the south the afternoon of the second day, and any likelihood of deer crossing the track depended upon the return of the colder winds.

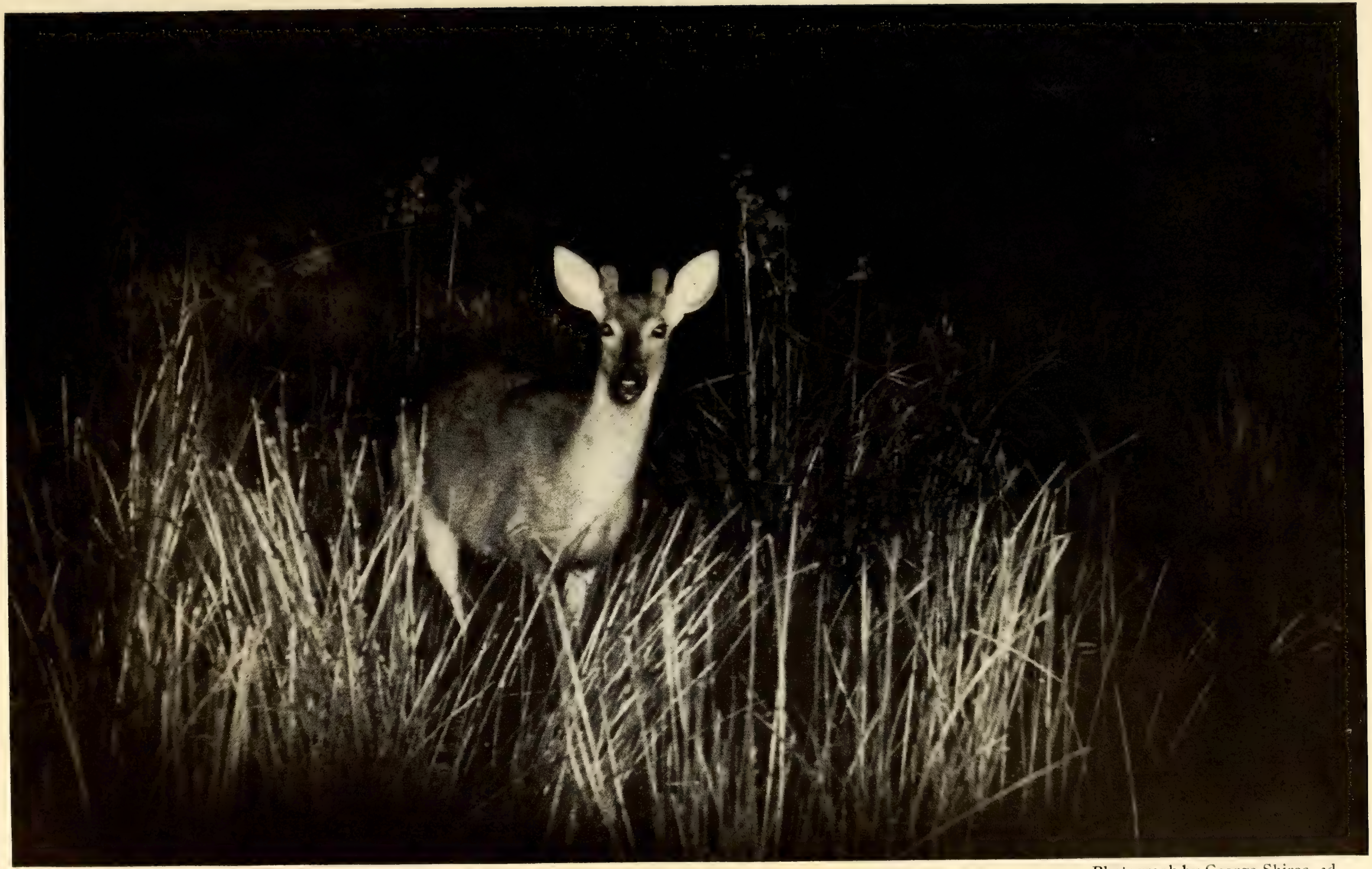
Toward evening we were visited by a miner of Irish extraction, who carried an ancient and rusty weapon of uncertain



Photograph by George Shiras, 3d

MIDNIGHT REFLECTION

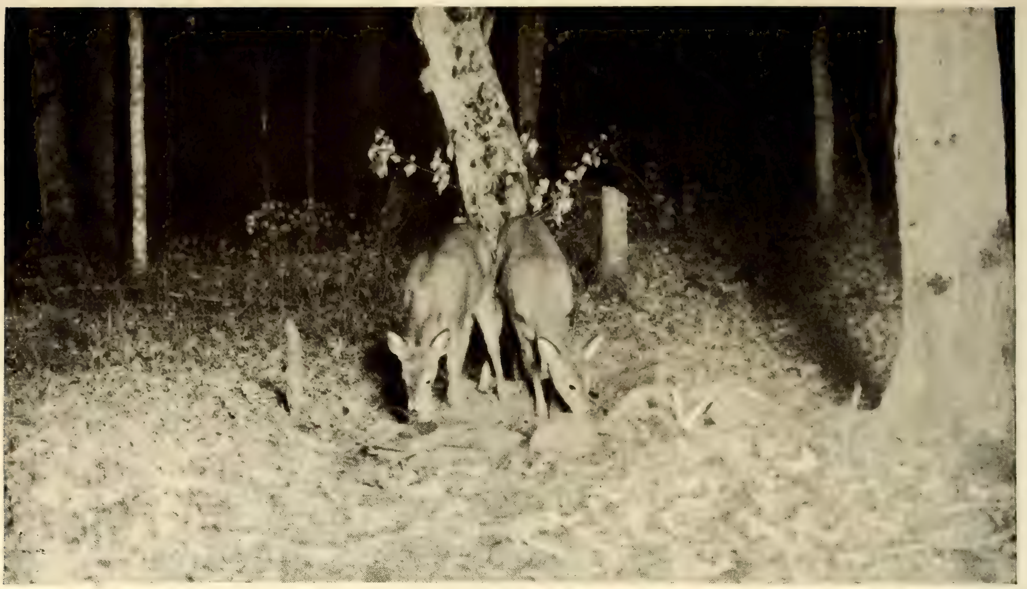
A flashlight of a feeding doe, showing indifference to the jack-light after watching it for a few minutes.



Photograph by George Shiras, 3d

A BIG SURPRISE FOR A LITTLE BUCK

This young animal fed toward the canoe, with its body partly concealed by the marsh vegetation; on raising its head at the edge of the reeds it was surprised to see the jack-light less than twelve feet away, and still more astonished when the flashlight exploded just in time to preserve the scene.



Photograph by George Shiras, 3d

THE FIRST FLASH, FOLLOWED A SECOND LATER BY ANOTHER, SHOWN ON OPPOSITE PAGE

caliber. He asked if he could borrow a headlight we had in camp, having been told by his companions that the only chance of getting a deer depended upon the use of such a light at night.

For nearly two miles along the railroad were deep ditches on either side, resulting from the removal of the earth for the road-bed when laid through the swamp. Throughout the summer these ditches were filled with many water plants liked by the deer. Both the local deer and those traveling south often came to the ditches after dark, where they could easily be shot by any one walking up and down the track with a headlight.

Having shot several deer before the wind changed and not caring for this method of hunting, except as a last resort, the light was prepared and the ambitious night hunter was instructed as to its use and told just how the shining eyes of a deer would look when reflecting the rays of the lantern.

Shortly after dark he started down the track. In the course of half an hour came a particularly heavy report, vindicating the aspirant's remark "that the gun was loaded with a handful of powder and another of slugs," and he "rather guessed it would lay out anything that came in the way."

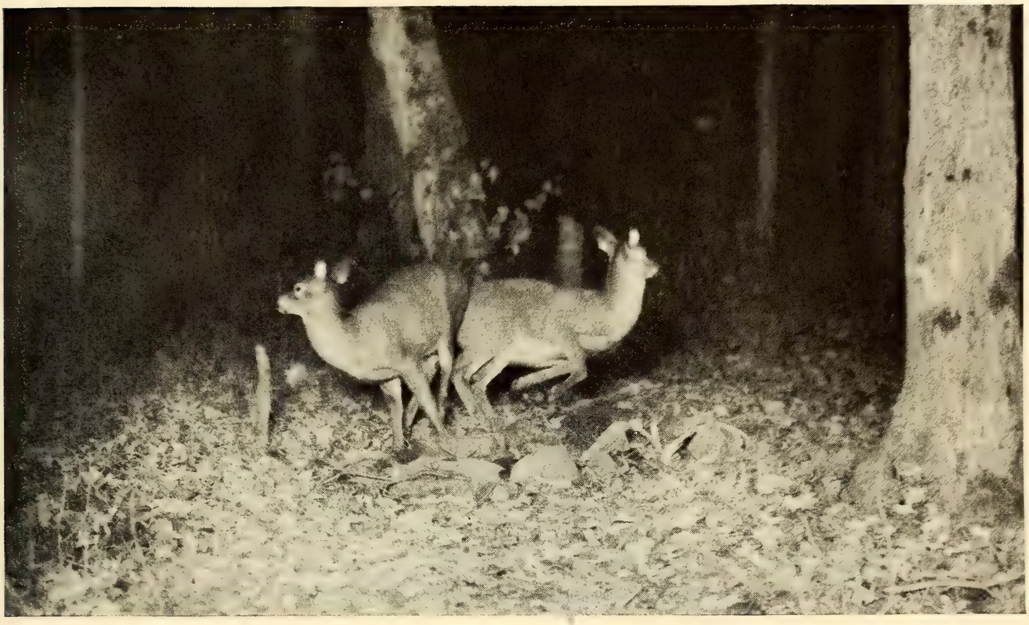
After waiting several hours, we went to bed, wondering just what had happened.

A PET SLAIN IN THE SECTION-HOUSE

At daybreak the fly of the tent was jerked open, disclosing the bulky form of the section boss, who lived half a mile down the track. Thereupon he grimly asked, "Were you boys out under the light last night?" A unanimous and spontaneous response in the negative seemed to reassure him, for he remarked it was a fortunate thing, since the time had come when a graveyard should be started for fool hunters in this neighborhood.

Pressed for an explanation, he said that after his men had gone to bed, there came an explosion, sounding as if "Mogul No. 9 had busted her boilers." Investigation showed the entire lower sash of a window of the section-house had been blown to pieces, while in the middle of the floor lay Black Tom, their cat, in a mutilated condition, the slugs continuing their course into logs between the upper and lower bunks containing several peaceful sleepers.

On opening the door and looking out, they saw a headlight and some fellow hastily reloading his gun. Thereupon each had seized an axe or a crowbar and



Photograph by George Shiras, 3d

A DOUBLY-INTERRUPTED MEAL

These twin fawns, on finding a pile of cabbage leaves behind camp, considered themselves in rare luck, but as the head of one was lowered the thread running from the stick on the left to the tree on the right released the flashlight; then the flame of the powder burned a string, releasing a leaden weight connected by a string with another flashlight and camera, thus showing a peaceful scene during the first flash (see opposite page), and the efforts of the fawns to bound away in different directions just as the second flash exploded.

started toward their assailant, "using language common to those parts; but, hampered by bare feet, they were unable to overtake him, and when last seen he was headed in this direction, going strong."

"CHASED BY WILD INDIANS"

Without further explanation, we knew that our unfortunate visitor had seen the glowing eyes of the cat, as it sat on the window-sill, and at such distance the section-house could not be seen; so, very naturally, he fired, thinking the eyes were those of a deer. But what had become of him and our light was now the question.

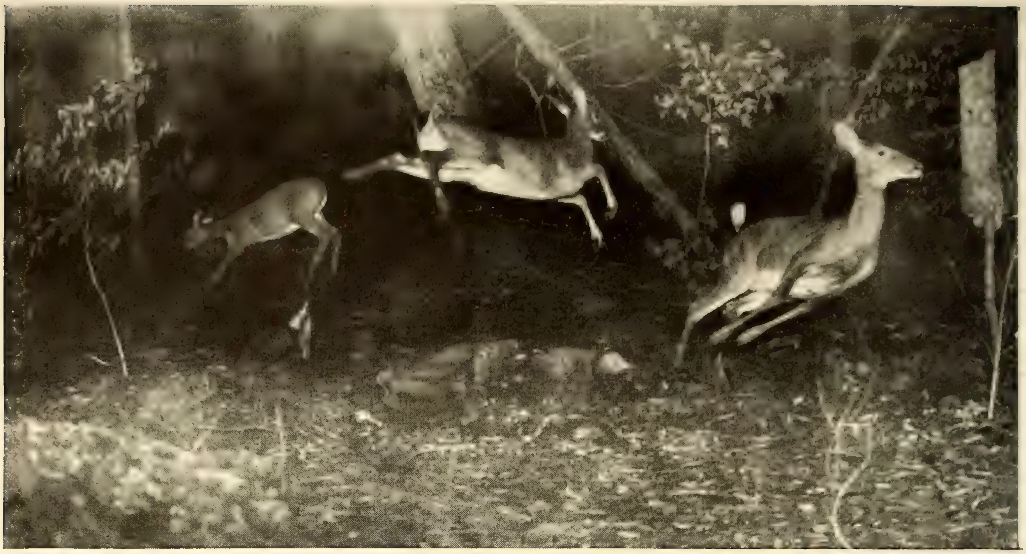
Toward noon a stranger appeared, and, depositing the lantern by the tent, prepared to depart with only a bare greeting. This, however, did not suit our idea of the situation; so he was asked what had become of the man who borrowed the light. Thereupon he said that Pat had crawled into the tent during the night with a tale about "being chased up the track by a band of wild Indians brandishing tomahawks and spears," and if he "had not been a sprinter they would have gotten his scalp." Furthermore, he said he intended taking the first ore train in the morning for the mines. Before leaving, however, he told how he had fired at a big pair of green eyes, following which came a crash and a chorus of war-whoops, and he added that this was all the deer hunting he needed for the remainder of his days.

THE END OF THE MIGRATION

As the number of hunters increased along the railroad each fall, scaffolds were built a little way to the north on some of the approaching runways, thus cutting off those lying in wait at the track and leading to many controversies.

On one occasion, when still hunting along a trail, I found the remains of an Indian deer fence running for half a mile to the southwest, showing that years before the Ojibways of the Lake Michigan shore had taken advantage of this migration.

It has always been well known that deer will not jump even a low obstruction



Photograph by George Shiras, 3d

CAUGHT ON THE JUMP

This animated scene was obtained by the deer firing a blank cartridge first, and as they bounded away a released weight discharged the flashlight. Note that the fawn has not yet acquired the quickness and agility of the adult deer.

if placed in the general direction they are traveling. Such a brush fence, when crossing a number of runways, leads all the migrating animals to a point where the Indian hunter could kill them readily, or when absent a pit covered with brush precipitated the animal to the bottom, in some instances impaled on sharp stakes.

In 1885, some twelve years after my first experience in hunting the migrating deer, I made what proved unexpectedly to be a last visit. On arriving at one of the favorite crossing places, a barbed-wire fence was found strung for miles, south of the track, and post-holes were ready on the opposite side. It was apparent at once that this double barrier would soon terminate the annual migration, and a winter home must thereafter be found along the inhospitable shores of Lake Superior.

Before putting up the tent, I took a position on a high bank, from which place I saw a deer crossing the track some distance above. I wondered which direction it would take when intercepted by the fence. In a short while the unfortunate animal came ambling along, looking for an opening to the south, when a bullet ended its career. Feeling that such hunting was unfair, I gathered my outfit together and left on the next train.

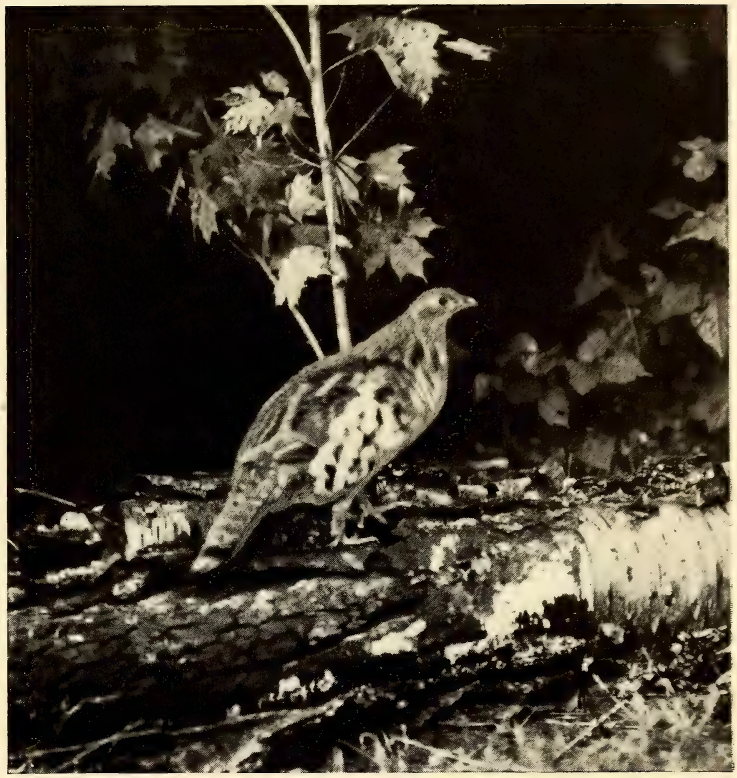
Thus ended the deer migration of many centuries. Today all the great runways are obliterated by bushes and fallen trees; but, contrary to expectation, the deer soon adjusted themselves to their permanent home on and near the south shores of the lake. While sometimes in great peril when the snows are deep or crusted, they have, on the whole, a safer place than their former winter retreats in the south, where a largely increased population would soon have taken a greater toll than the timber-wolf or the lawless hunter of the north.

FACTS AND FALLACIES ABOUT THE WHITE-TAIL

There has always been a tendency on the part of some, when describing the white-tail, to illustrate the text with heads bearing an extraordinary number of points, whereas this animal, like the elk, is the only other member of the deer family having a growth of antlers remarkably uniform in size, shape, and number of points.

Any with thirty to forty tines or half that number are simply freaks and no more typical of the white-tail than one with three legs or two tails. Several million bucks have been killed in the United States, Canada, and Mexico in the past seventy-five years, and most of those of unusual size or marked eccentricities in growth have been saved; so that it would be strange if in this large total there were not several dozen having an abnormal number of points or some unusual malformation.

The yearling buck is called a "spike horn"; the second year the antler has two points and is Y-shaped, and on the third, fourth, and sometimes the fifth there is an additional prong, representing with fair accuracy the earlier years. Thereafter there is no means of estimating the age except by the size and massiveness of the beam, which becomes uncertain when a deer passes beyond its prime, for then there is usually a recession in the size and weight of the antlers.



Photograph by George Shiras, 3d

A RUFFED GROUSE THAT TOOK ITS OWN PICTURE

At the edge of a clearing a bunch of mountain-ash berries was hung on a maple sapling, with a thread running to the camera shutter. A little later a female grouse pressed against the thread, with the resultant picture.

The maximum number of points vary from four to five, according to the range. In the south they are usually "four-pointers"; in the north and southwest the largest bucks average five points, which may be considered the standard in the respective localities.

PECULIAR GROWTH OF ANTLERS NOT DUE TO INJURY WHEN YOUNG

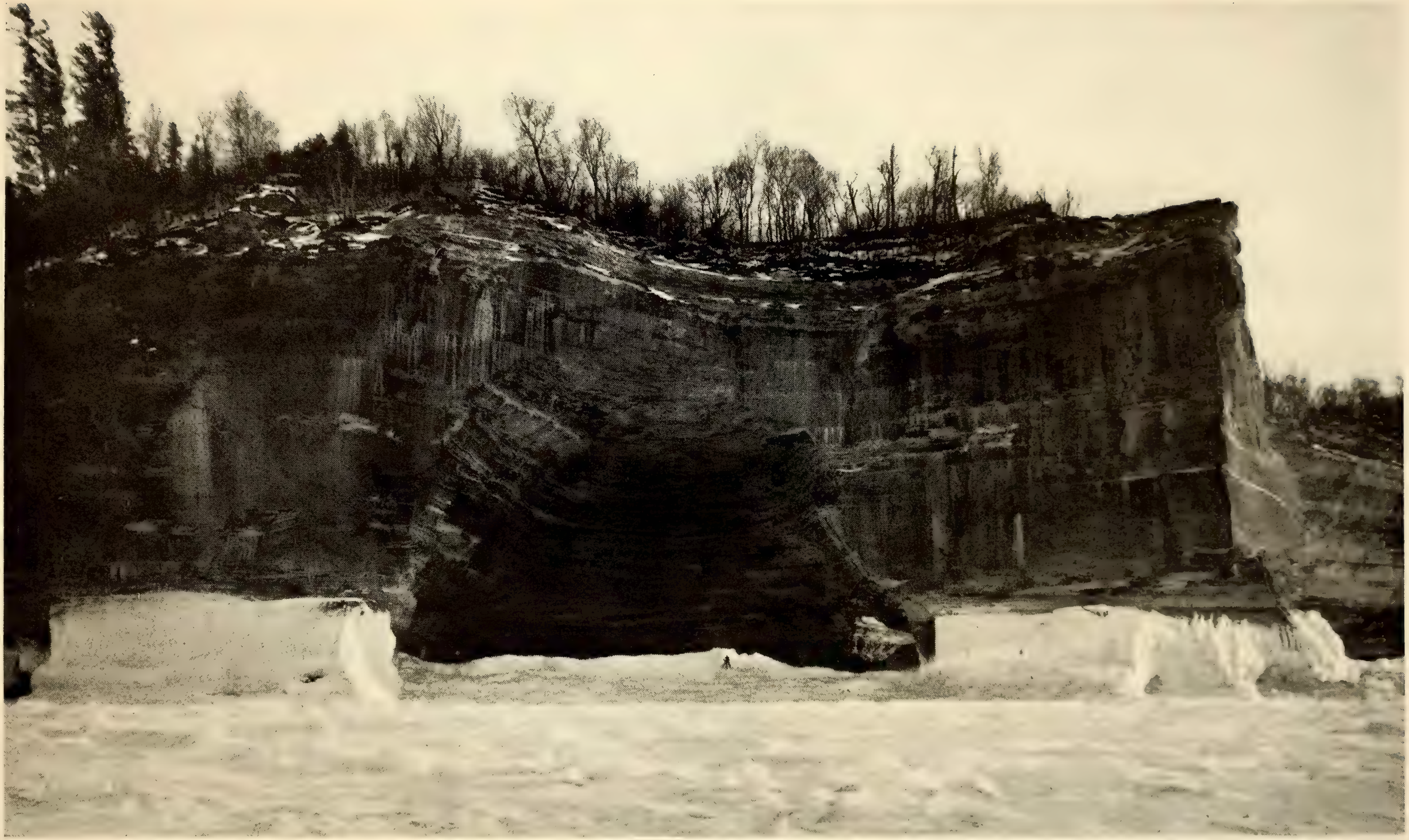
Sometime it has been suggested that a head having a great cluster of tines or other abnormalities has resulted from an external injury during early growth, but this, too, is erroneous, for with hardly an exception a peculiarity in one antler is duplicated in the other; and, moreover, these persist year after year in the same animal; consequently the internal growth is of symmetrical formation and in nowise affected by external causes.

Another fallacy—in fact, a double one—is the belief of many that the variance often noticed in the color of the antlers is due to a stain when the velvet is supposedly rubbed off on saplings, those of resinous character staining one color and those with a different sap another color. Any such uniformity in results is impossible, and would only cause a temporary and limited discoloration.

But, what is more to the point, no member of the deer family removes the skin-covering, or so-called velvet, at the time or in the manner suggested, though occasionally a buck will use its forefeet for this purpose, or gently switch its antlers in the brush.

"HORNING" OF TREES A SEXUAL MANIFESTATION

The "horning" of a young tree evidences the beginning of the rutting season, being purely a sexual manifestation.



NORTH END OF GRAND ISLAND, THE WESTERLY TERMINUS OF THE PICTURED ROCKS

It was over this precipice the imported Newfoundland caribou were supposed to have met their fate when chased by a timber wolf (see page 181). Note the human figures at the base of the cliff.

These trees are rubbed fully a month after the velvet has been shed, and some weeks before the does are responsive, or about October 15, in the Lake Superior district.

In the past ten years I have been in the Michigan forest during all that month, my notes showing that the first rubbed sapling was October 5, and in the nine other years the date averaged the middle of that month.

In rubbing the antlers on a sapling, the white-tail lowers the head until the nose comes within a couple of inches of the ground, and then, in a deliberate way, one beam is pressed against the tree, the friction removing the outer strip of bark for about sixteen inches, showing the fresh white streak of the inner wood. The tree, small as it is, is seldom girdled, indicating that the animal stands in one position.

CARIBOU AND ELK ATTACK TREES AS IMAGINARY RIVALS

The caribou and elk, however, often regard the tree as an imaginary rival, attacking it with considerable vigor. Once I saw a bull elk butt a lower branch of a heavy red cedar, and as the limb rebounded the animal received a stinging blow in the face; whereupon he charged with the full weight of the body, snapping off the limb with a report heard 200 yards away.

The does bear their fawns on the higher ground, between May 25 and June 25, or seven months after the rut, concealing their young in balsam or maple thickets, where the family group lingers until fall, being more open to attack by the illegal hunter than the bucks, who hide in the thick and almost impenetrable swamps.

On the coming of the heavier frosts, in early October, the bucks wander about in the night, rubbing the trees and pawing up the ground some weeks in advance of the mating season, which occurs between October 20 and November 20, shortly after which the antlers are discarded, usually between December 1 and January 15.

Contrary to general belief, the antlers are not for use in defense against predatory animals, like the wolf, for they are shed before the coming of the deep snows and when open waters still offer an effective means of baffling pursuers. When chased thereafter a buck will make his final stand by facing the foe, rearing high and coming down with the sharp forefeet on any animal attacking from the front.

ANTLERS USED IN MOCK BATTLES

The antlers are, therefore, purely a sexual manifestation, being used freely in mock battles with a rival. These sometimes develop into a serious affray, and then death may come when the antlers are inextricably interlocked.

The larger bucks weigh between 200 and 300 pounds, and it has long appeared to me that those of upper Michigan, either by gradual evolution or survivorship, possess much longer limbs than any of the species elsewhere. Living permanently in a region of deeper snows, it would seem that the ones having the longest legs would get a better footing or be able more easily to leap over logs or windfalls when being driven by the timber-wolf.

On the other hand, the deer of the lower Alleghany Mountains in the State of West Virginia seem to have unusually short legs, for in this region their only safe retreat from hounds or man are the dense laurel thickets, where many of the runways pass under gnarled limbs only a foot or two above the ground, so that the ones more likely to escape pursuit are those capable of entering the first thicket or passing from one to another.

HOW THE MICHIGAN LICENSE SYSTEM NEARLY EXTERMINATED THE DEER

As a step toward conserving the deer, the number that could be killed annually in 1895 was restricted in Michigan to five for each hunter, and the license bore five detachable coupons for use in tagging each carcass. In the opinion of all sportsmen, this new system was expected to be of the greatest future value.

Then occurred an extraordinary psychological influence, upsetting all calculations, and Marquette County well illustrated what happened throughout the Upper Peninsula. Heretofore about three hundred persons hunted deer annually in this county. When the first licenses were issued, the usual number that had hunted previously applied for permits, but it was noticed these applications kept on increasing throughout the season, until they totaled 652, far exceeding any previous year.

From this it appeared the public got the idea the State had awarded each of its citizens five deer a year at a nominal cost for those thrifty enough to act.

NUMBER OF HUNTERS INCREASED BY LICENSE SYSTEM

The following season other influences directly traceable to the license system not only increased the number of hunters, but, to a disproportionate extent, the number of deer killed; for it was observed that persons who theretofore were content with a single deer, or when disappointed on a hunt gave up at once in disgust, now tried to kill their legal limit, going to the woods again and again in this endeavor, and were not above having others supply the missing number if unsuccessful.

This situation was further influenced by the newspapers containing many personal items to the effect that "John Doe has filled his license during the first week," or that "Richard Roe expects to do so on the next hunt," and other suggestive statements, making each licensee feel he was on trial as a sportsman and a possible subject of ridicule when returning empty handed. Moreover, the licenses, with their strips of coupons, were conspicuously displayed in factories, shops, and offices or on the street corners, until hundreds who never had the slightest idea of hunting deer joined the crowds on their way to the county clerk's office.

An examination of the following figures ought to prove of interest, especially in view of the fact that there was no increase of population in this county, but actually a small decline during the period indicated.

MARQUETTE COUNTY DEER LICENSES

Year.	Licenses issued.
1894 . . . . (estimated)	300
1895	640
1896	813
1897	853
1898	950
1899	1,047
1900	1,306
1901	1,532
1902	1,749
1903	1,942
1904	2,060
1919	3,379

This extraordinary increase from about 300 before licenses were issued to more than 3,300 hunters in a single county seems to have no other explanation than the one given. The system has brought about the destruction in the State of more than two hundred thousand deer that would otherwise have escaped and has continued indefinitely a well-organized band of hunters.

However, the license system in vogue throughout the most of the country has been of greatest value, supplying each State with ample funds for preserving the game and in many other respects proving of inestimable service. It just so happened to have had the opposite effect with Michigan's one big-game animal.

TEN DOES WILL HAVE 1,510 DESCENDANTS IN TEN YEARS

The white-tail is the one big-game animal whose perpetuation means more to the sportsmen of the entire country than any other animal.

The first and foremost necessity is a buck law to protect the females and fawns in every State containing any antlered animal.* Just let it be understood that when a buck is shot the number for the following year is lessened by only one, whereas he who kills a young doe destroys, by a single shot, potentially 151 bucks and 151 does! For it has been shown, upon a strictly scientific basis and by an accurate mathematical calculation, that a doe and her descendants in a period of ten years, not counting out the natural casualties, will produce a total of 302 deer, and by the death of this ancestral mother the link is broken, with the irrevocable loss stated.

The same proportion holds true with a larger number, for ten does and their descendants will produce 1,510 bucks and 1,510 does, showing that when the female is protected more deer can be killed each year, beside leaving an increased number in the woods.

Such a result is not, after all, so mys-

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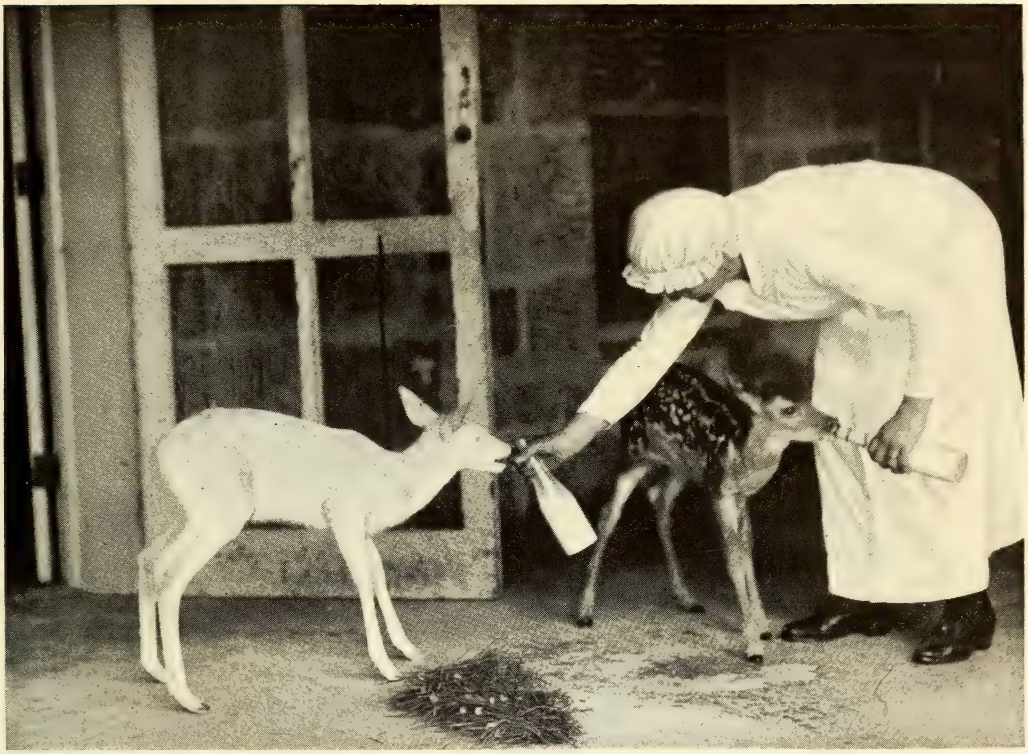
* Twenty States have passed this law.



Photograph by George Shiras, 3d

WHITE FAWN FOUND IN 1916, WHEN A DAY OR TWO OLD

Reared in company with the red fawn. The usual row of white spots can be seen on the white body (see page 183).

terious, if we keep in mind the methods of reproduction applicable to domestic animals; for if a farmer had as many bulls as cows, as many roosters as hens, and killed them indiscriminately of sex, he would, of course, be classed as demented.

Just because our wild animals bear their young in remote thickets, we seem to think their maintenance is based upon a different method, and go on killing the females year in and out under the blind assumption that it can make no particular difference in the future supply, whereas it represents the difference between extinction and perpetuation.

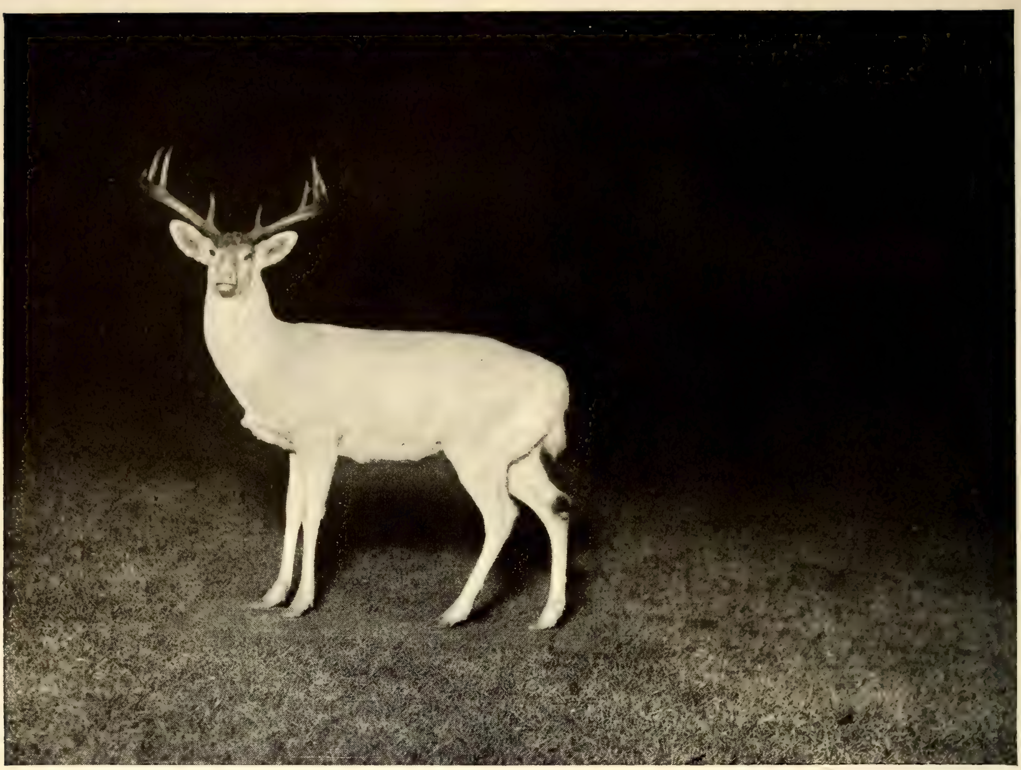
In my boyhood days it is doubtful if there were a thousand deer in the wilder portions of Pennsylvania. Last year 3,000 bucks were killed in that State, and this number will increase steadily, the only limitation being a sufficient area to sustain such a multiplication of the species. But in this State, like New York and Vermont, the second growth in rough and mountainous portions has been restocked with game and properly safeguarded, showing how the older localities have already taken advantage of the favorable change in environment (see page 204).

CHAPTER IV

THE SUDDEN DISAPPEARANCE OF THE PASSENGER PIGEON IS THE GREATEST OF ALL BIRD MYSTERIES

The final stand of the passenger pigeon was made in northern Michigan, Wisconsin, and western Ontario, and in this general locality I witnessed the demise of a once countless species. Gradually the flocks had been driven from their haunts in the Atlantic coast states and about the Ohio Valley, but from the time I first went to Lake Superior to the date of their sudden disappearance, the wild pigeon seemed to be present each season in its usual abundance.

For a species that far exceeded any other game bird, a gradual decrease



Photograph by George Shiras, 3d

THE ANCESTOR OF THE ALBINO DEER HERD OF GRAND ISLAND

Observed first in 1912; killed by a pot-hunter in 1914, when about seven years of age. Body mounted as above. Spread of antlers, 2 feet 2 inches; weight, 150 pounds. It has had nine white descendants so far (see page 182).

might be attributed to several reasons apart from the various and continuous methods of destruction, namely: the range was always east of the Great Plains, thereby permitting concentrated hunting in the more accessible regions. Furthermore, each pair had but one young, in contrast to the domestic pigeon, with double the number. However, their unexpected and inexplicable extinction in, perhaps, a single season constitutes the greatest of all ornithological mysteries.

The birds came in vast flocks to Lake Superior in May, and before colonizing for nesting they were killed by natives, who fired into the passing flocks as they swept low along the shores, this being the only period when wing-shooting was indulged in.

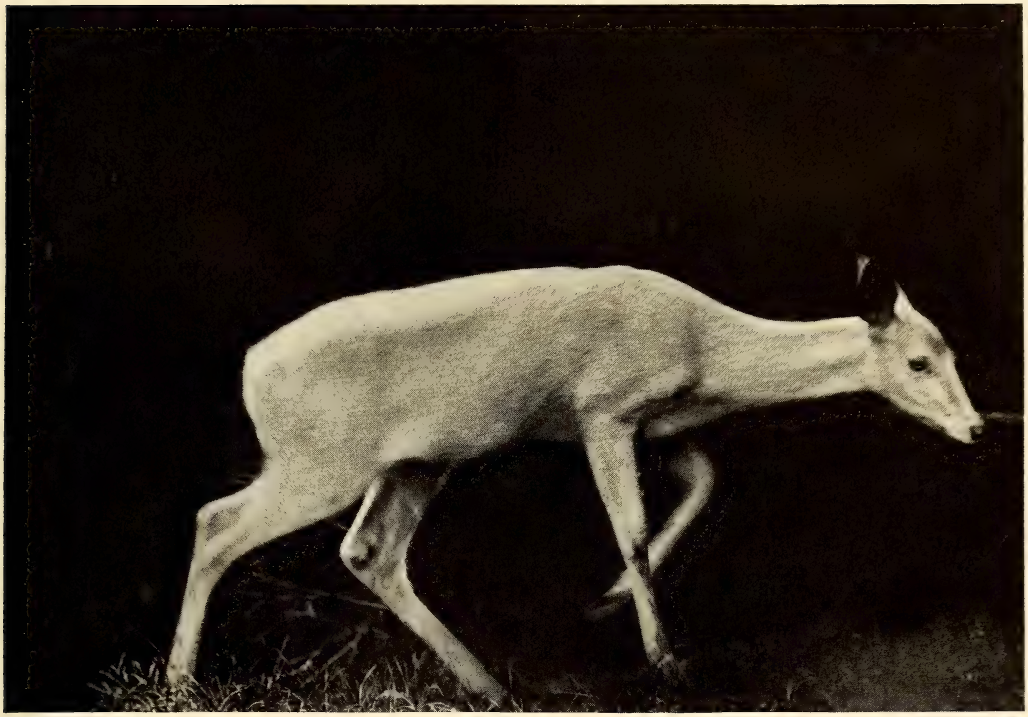
After the birds had selected a breeeding place, usually in the same locality each year, the slaughter began; for, besides the local hunters, the professional trappers were quickly notified of any gathering place, and were soon on hand netting or killing these birds by the thousands for the eastern market, besides shipping them alive in crates for trap-shooting tournaments.

BIRDS SLAUGHTERED BY FIRELIGHT

I never attended any of the holocausts at the breeding places, for such they often were, since circular fires were built around the roosts after all the birds had assembled for the night, and in the confusion of the smoke and flames they were beaten down and destroyed in the most relentless manner.

About the middle of July the survivors, with their young, dispersed over much of the surrounding country, gathering particularly about huckleberry plains and burnt-over districts, where ground food—huckleberries, alder-berries, wild cherries, and service-berries—were abundant.

After the wild fruits were gone many



Photograph by George Shiras, 3d

FIRST ALBINO FAWN, AT THE AGE OF THREE YEARS, IN ITS SUMMER COAT, WHEN THE PINK SKIN SHOWS PLAINLY THROUGH THE THIN, WHITE HAIR (SEE P. 185)

flocks moved into Canada, where a later berry season was the attraction, and by October all departed for the south, unless a heavy crop of beechnuts led some to linger.

It was in August, 1885, that I made the usual trip to some large plains covered with huckleberries, ten miles up the shore from Marquette and inland about a mile, where it was my custom to kill, once a year, a large number of pigeons for distribution among friends. Such an expedition differs from the ones where shooting was limited to a few for camp use.

Selecting the young, so readily told by the immature plumage, it took only a few hours to accomplish my quest. At this time the birds were in their usual numbers, and I returned under the belief the wild pigeon would continue for many years in this region.

BIRDS SUDDENLY VANISH

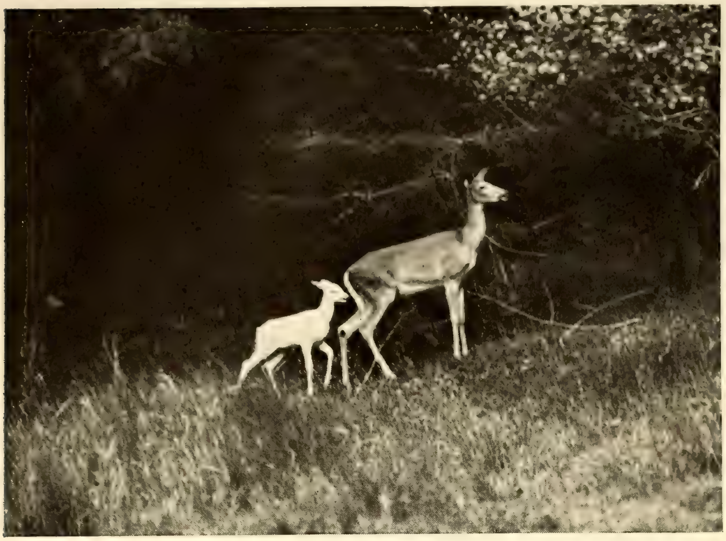
The next season I saw a single bird; but, like the rest of the hunters, concluded that for some unforeseen reason the pigeons had gone elsewhere and would surely return the following year. But not one, to my knowledge, has been seen since along the Lake Superior shores.

When the unfortunate history of this bird is examined, it is not hard to see that it was doomed because it was a migrant. The rule in each State was to have an open season when such migrants were present and a closed season, if any, after they had gone. This meant, of course, continuous shooting throughout the year.

In 1857 the Ohio legislature enacted a law protecting local game birds, and the committee report gave as a reason for not including the wild pigeon the following:

> The passenger pigeon needs no protection. Wonderfully prolific, having the vast forests of the north as its breeding grounds, traveling hundreds of miles in search of food, it is here today and elsewhere tomorrow, and no ordinary destruction can lessen them or be missed from the myriads that are yearly produced.

The fact that migrant game birds, above all others, needed protection was not seen at that time, and not until long afterward, when the passage of the Federal migratory bird law made possible an



Photograph by George Shiras, 3d

SECOND WHITE FAWN AND THE NORMALLY COLORED MOTHER

Both are wild and unapproachable (see page 183).

adjustment of the open seasons throughout the country consistent with the protection of this class of birds.*

An epidemic or some convulsion of the elements, such as an offshore gale, with the clouds raining down heavy hailstones, may have accounted for their sudden disappearance, but from information available one can only guess as to the immediate cause which brought about their untimely end.

RUFFED GROUSE MOST HIGHLY ESTEEMED OF UPLAND BIRDS

The most highly esteemed game bird of the northern uplands, whether for sport or the table, is the ruffed grouse. Clothed in rich gradations of brown or gray, the neck encircled by a ruff of iridescent black, erect in figure, with a sweeping fan-like tail, its presence is often disclosed by a sudden whirr and a meteoric flight, startling even to the expectant hunter or the trailing fox.

With the extinction of the passenger pigeon, once so numerous about Lake Superior, and the rarity with which shore birds or wild fowl venture across broad waters with unsighted shores, the perpetuation of the ruffed grouse as the sole resident game bird of the region becomes unusually important.

On my first camping trips the grouse were found in many clearings, second-growth thickets, and about old lumber roads; for berries, insects, seeds, and sunlight induced such gatherings. For years I was under the impression that this bird was well distributed and numerous. Later I found that in the main forests and in localities where water was distant more than a quarter of a mile scarcely a grouse could be seen, except when midwinter drove them into the heavier timber.

After the local hunters increased tenfold and the automobile gave access to the more remote places, the grouse of upper Michigan declined to a point where extinction was imminent and appeared certain when two cold, wet springs occurred and hardly a young bird survived.

A REMARKABLE INCREASE IN BIRDS

In 1917 the legislature closed the season for two years, and the result exceeded all expectations. The ensuing year showed a great many scattered coveys, and the next they more than doubled, while in the spring and summer preceding the open season the birds were found in numbers never known before in the history of the country, automobiles being stopped frequently by birds dusting themselves in the woodland roads.

With a daily limit of five birds and a total of 25 for the season, one might have supposed that the number killed would hardly have equaled the best years of the earlier days. But they were brought in the first day by the hundreds, by thousands the next week, and then by tens of thousands, exceeding a total of one hundred thousand in the shortest season.

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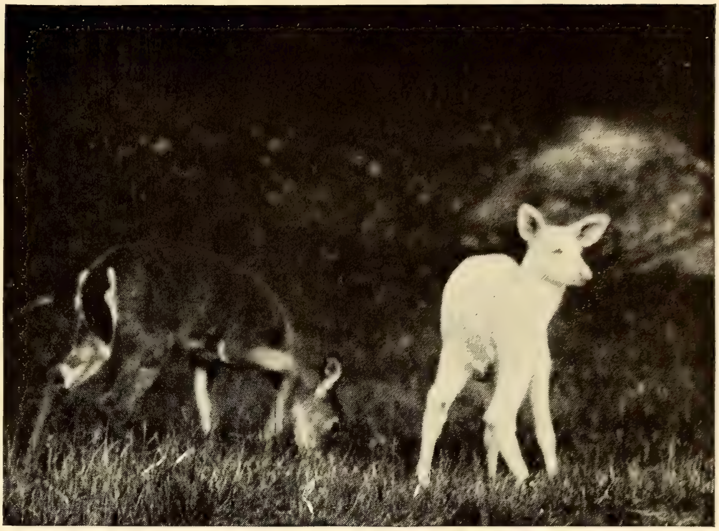
* Mr. Shiras has refrained from stating that in 1904, when a member of Congress, he was the author of the original migratory bird bill, the later enactment of which has insured not only the perpetuation of our wild fowl and insectivorous birds, but has already led to a greatly increased number. This measure is generally regarded as the most important game legislation that has been passed by State or nation.—EDITOR.

In Minnesota in 1920, under a similar closed season, but with larger bag limits, the kill was unparalleled, with a total exceeding 500,000 grouse.

THE GROUSE THRIVED IN CLEARINGS

Many might naturally think that this wonderful increase was wholly due to the previous closed seasons. While undoubtedly making such a showing possible, in the writer's opinion the result was primarily due to another distinct and, fortunately, permanent cause, namely, a gradual and favorable change in environment during some thirty years preceding.



Photograph by George Shiras, 3d

SAME WHITE FAWN AND COMPANION IN FALL, WHEN EACH HAS LOST THE WHITE SPOTS (SEE PAGE 183)

By reason of overshooting and unfavorable weather, the grouse of Michigan, Wisconsin, Minnesota, and western Ontario had been greatly reduced, only a scattered bird being found here and there. With a two years' closed season the remnant had an opportunity to establish itself in the thousands of clearings where few birds had ever had a chance before. The fact that one pair and their offspring would produce some 200 birds during the period they were thus protected indicates how the grouse was able to spread quickly through the entire region.

BIRDS NOW SHOT ON THE WING

The daily limit of five birds has resulted in a new form of sport in northern Michigan. Accustomed in this region to killing the grouse on the ground or in the trees, the hunters soon found the limit of five birds might be reached shortly after discovering a well-filled covey, and the day's sport ended in a moment. Therefore, for the first time, many began shooting on the wing, using thousands of shells without much damage to the fleeing birds, but greatly expanding the day's sport.

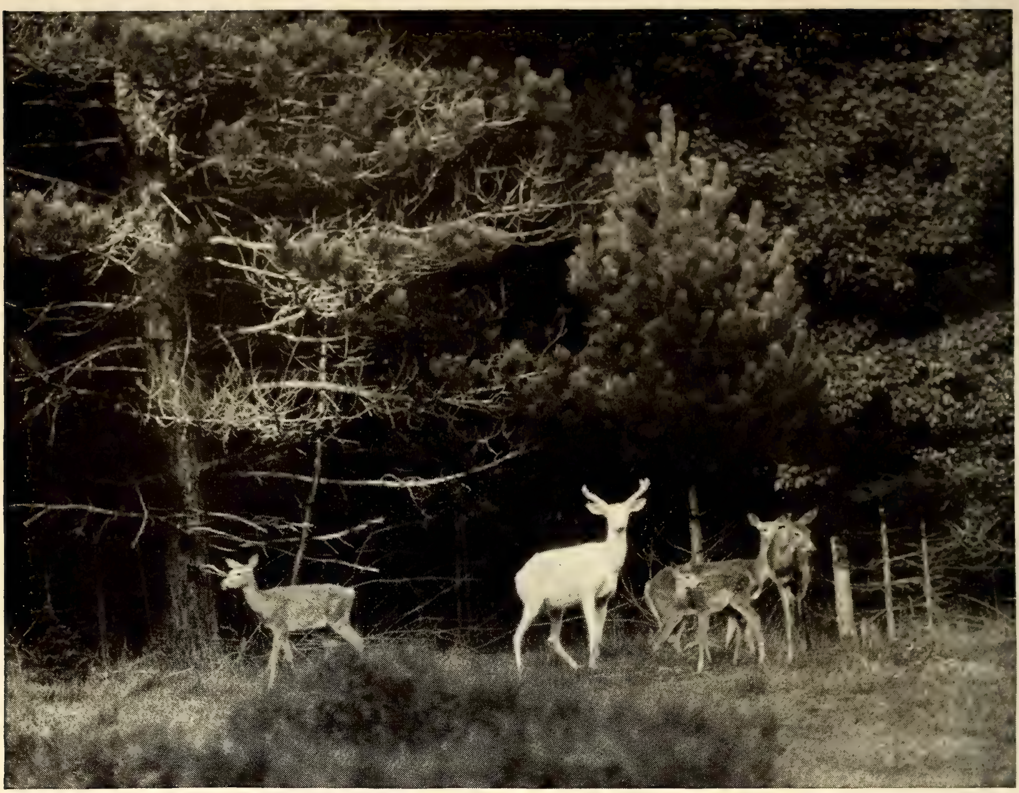
"A dead bird tells no tales," but the many survivors of this aërial bombardment have received a greater education regarding the use of gun than any of their predecessors, many finally acquiring the alertness and caution of the grouse of the Eastern coverts.

PECULIAR HABITS OF THE GROUSE

In the temperate months the grouse has an excellent choice of food, consisting of a great variety of berries, small fruit, seeds, buds, clover, beechnuts, grasshoppers, and a multitude of young, tender leaves. In the winter one wonders at their survival; for now the fall flight of the robins completely exhausts the berries, which were wont to linger and ripen well into winter, compelling the grouse to depend largely upon yellow birch buds, with many a forced meal on an evergreen.

Fortunately, whenever the temperature is far below zero the sky is usually clear and the grouse are active and unconcerned, but if the days and nights are dark and cold or the air filled with merciless pellets, they have the habit of plunging from a higher branch head foremost into deep snowdrifts, where a foot below the surface the heat and weight of the body form a globular retreat, in which they remain comfortably until the storm clears or hunger forces an exit.

Once when seated in a tree watching for deer, several days after the conclusion



Photograph by George Shiras, 3d

SECOND ALBINO BUCK, CAPTURED IN 1915, WHEN THREE YEARS OLD; WEIGHT, 160 POUNDS

Shown above with three normal deer and fawn. Antlers each year in the form of long spikes, with one forked. Note white velvet on the growing antlers (see page 185).

of a heavy snowstorm, I saw what looked like a small mouse at the base of a maple tree, and then this dark object elongated into the head and neck of a grouse. Finding the weather to its taste, it emerged, clucking and spreading its tail before taking flight for a repast upon the swollen buds of a near-by birch.

Many years later, while hunting the varying hare, just as a blizzard came sweeping in from Lake Superior, I saw the swift descent of a dark body from a tree ahead and a slight disturbance in the snow. Noticing a grouse in the same tree, I knew its companion had sought warmth and protection in the coverlet below and I withdrew without disturbing either.

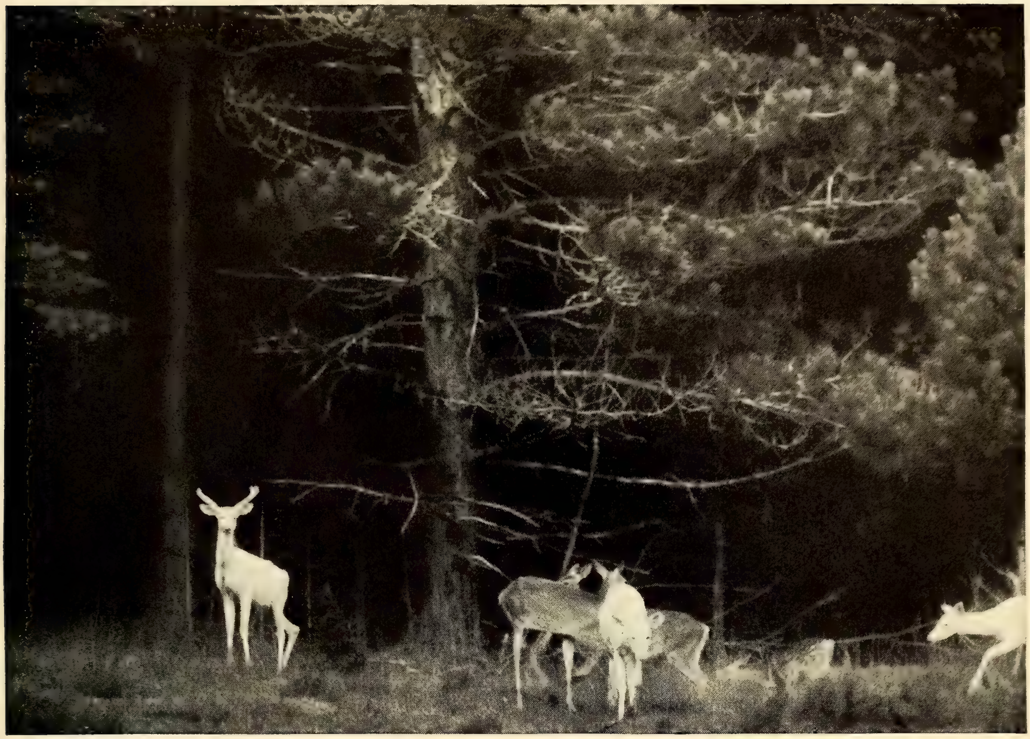
Sometimes in winter or the early spring there may come a rain or a warm day that melts the surface snow, followed by severe weather, and then thousands of grouse are imprisoned and the heretofore safe retreat becomes their tomb, should weeks pass by before the seal is broken.

CHAPTER V

EXTRAORDINARY CATCH OF LAKE TROUT WITH TROLLING LINES

In 1872, when 12 years old, I had an early introduction to lake trout. A report was brought to Marquette by a lumber-laden schooner, becalmed for a while in the vicinity of Stannards Rock, a sandstone reef lying a few feet below the surface, some forty-five miles northwest of the town, that the waters about the reef were surrounded by immense schools of lake trout. It was said that the fish could be hauled aboard the schooner by simply casting a trolling spoon overboard, when there was such a rush by the fish that one could imagine it was a contest to see which one might be caught first.

An enterprising captain of a local ex-



Photograph by George Shiras, 3d

WHITE BUCK WITH A MIXED HAREM OF WHITE AND RED DOES

This buck never recovered from the shock of its capture, remaining wild and lame (see page 182).

cursion steamer thereupon advertised an expedition to this vicinity, and about seventy-five persons, including women and children, departed under bright skies and unruffled waters. At noon the dangerous reef was approached cautiously, and the steamer anchored in about thirty feet of water.

Soon ten boats were lowered over the side, each expectant fisherman having a trolling line, as many as four or five lines trailing behind each boat. In a few minutes there was a rush of eager fish, and to my youthful mind there never were such scenes of excitement, for as the boats circled about the reef the long lines were diverted at various angles by the larger fish, becoming entangled, while the continued flopping of those captured caused the women and children to shriek in triumph or dismay.

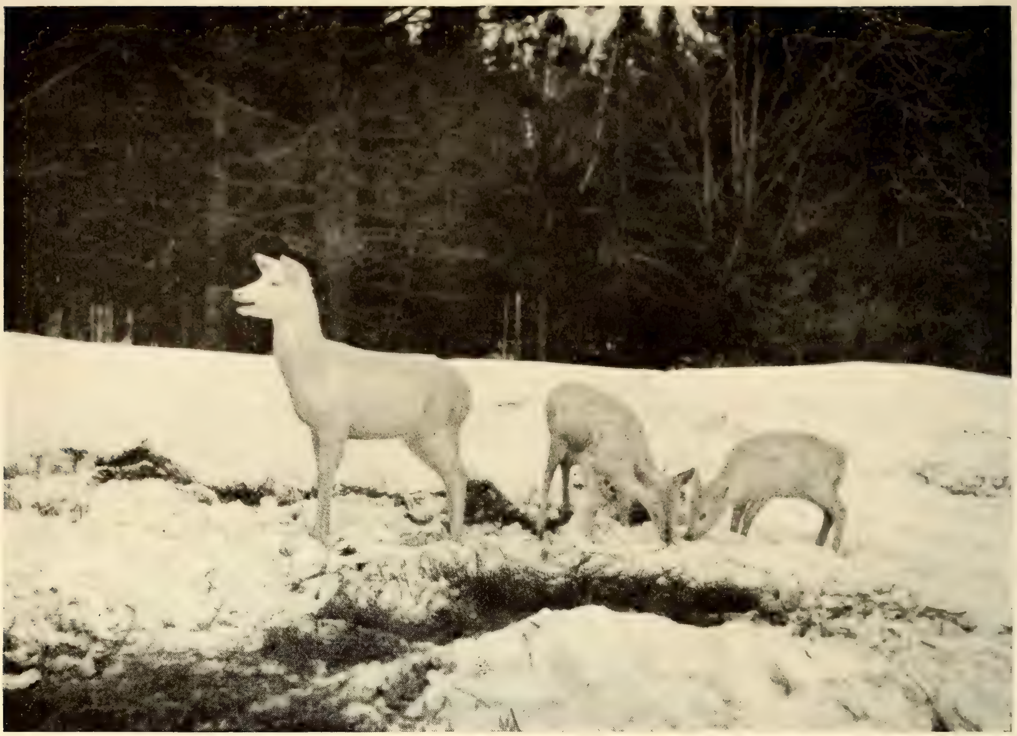
Several times I had on a fish weighing over twenty-five pounds, which only with the aid of stronger arms could be lifted free of the water. In one instance a spoon that became detached was cast overboard and a near-by fish bolted it and went off in triumph! In several cases tin-tipped oar-blades were seized, so anxious were the fish to try anything having a resemblance to living prey.

In less than three hours a thousand fish were taken, averaging ten pounds, and then this riot of destruction came to an end, for it finally became apparent how difficult it would be to give away five tons of trout among the friends and neighbors of the participants.

The results of this expedition soon reached the ears of the local fishermen, and for several succeeding seasons immense catches were made. Now a towering lighthouse surmounts this rock as a warning to the mariner and a fitting monument to the myriad of fish that have long since passed away.

AN IMPROVISED COOKING OUTFIT

On one of my earliest camping trips for speckled trout, with old Jack as guide, we rowed about three miles when it was discovered that the box containing the



Photograph by George Shiras, 3d

A PIG-LIKE ALBINO BUCK AND TWO WHITE FAWNS: GRAND ISLAND (SEE PAGE 182)

cooking outfit had been left behind. Naturally, I suggested returning for it; but Jack promptly said it would bring bad luck to do this after once having made the start, and, besides, with our pocketknives it was easy to make what was needed.

In about three hours Shot Point was reached, the first rocks to the east, where I began fishing, leaving Jack to put up the tent and start the fire.

MAKING A FRYING PAN FROM A CAN

On returning with a creel of trout, I found Jack had already replaced the missing outfit. From large sheets of birch bark he had fashioned plates, while cups and other containers were made of the same material, with knives from hardwood and forks of double-jointed twigs. In the fire was a can of tomatoes perforated in the top to let out the steam, while well beneath the glowing coals half a dozen potatoes were baking. Alongside he placed the dressed trout, wrapped in wet, brown paper. Then the tomato can was emptied into a birch-bark dish before the fire, and with a piece of wire a bail was made for it, and soon the tea was boiling.

At the next meal, after heating a can of beans and removing the contents, it was cut and flattened into a frying-pan, with a handle made of a split stick, serving thereafter for frying trout or bacon and the all-important flapjacks.

On suggesting to Jack that several of these fireside conveniences depended upon having canned goods, he thereupon picked up a small boulder and explained that, after heating several of these in the coals, by putting them into the birch-bark bowl one could brew tea, make soup, boil fish, or have a stew.

This was my first lesson in the ease with which supposed essentials might be left behind, proving a useful experience when forced to travel light, or a capsize of the canoe sent the outfit to the bottom.

THE SPECKLED TROUT OF LAKE SUPERIOR

Prior to 1890 the range of the speckled trout included all of the shore waters for more than a thousand miles, except in places where sand beaches lacked coarse gravel or boulders, or continuous cliffs made the steady surge of the receding waves an unsuitable location for a fish particularly disliking turbid or unsheltered waters.

Every tributary stream contained trout as the permanent and almost sole occupants, with the temporary addition of all in the lake during the spawning season, unless flowing from headwater lakes, in which case the higher temperature and the existence of pickerel or bass discouraged their presence.

Consequently, good fishing was within easy reach of every settlement and camping place, the trout occupying a narrow strip within 50 feet of the shore or nearby islets and reefs, for beyond were the giant lake trout, which, while respecting absolutely the riparian rights of their more aristocratic kin, allowed no trespass in their own domain.

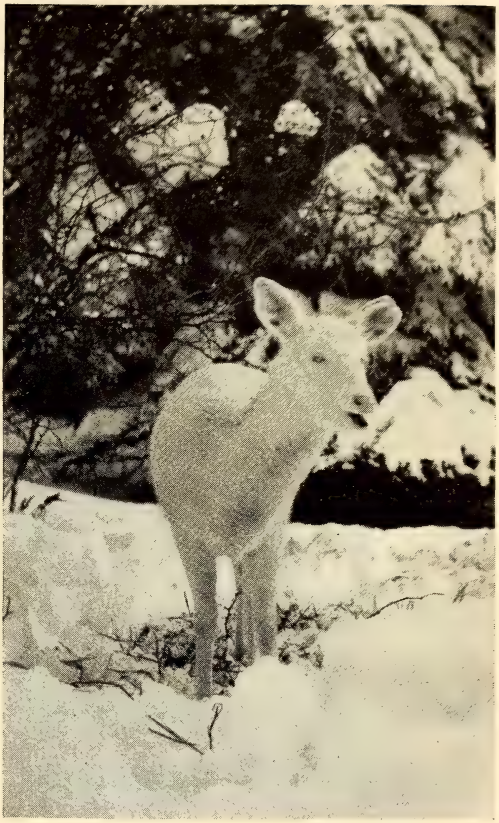
On the other hand, just to the east, Lake Huron, including Georgian Bay and the southern portion of Ontario, contained no speckled trout except in an isolated case or two, for bass, pickerel, pike, and land-locked salmon abounded, the less abrupt watersheds favoring chains of lakes with sluggish, interconnecting streams of a high temperature in summer.

A TROUT FISHER OF 70 YEARS AGO

In 1849 the paternal grandfather of the writer first came to Lake Superior, intent solely on trout fishing, having heard from pioneer business friends of the beauty and healthfulness of the region and the wonderful trout fishing. At the time of his earlier visits it was necessary to transfer around the Sault rapids, taking a small steamer that had been assembled beyond, when visiting any of the few settlements on Lake Superior.

To one who had fished only the brook trout of the Alleghany Mountains, the size, brilliancy, and activity of those in the lake were in striking contrast, and in the long period following he seldom visited any stream, for the smaller fish and their ease of capture did not appeal to him.

Accustomed to making his own bamboo rods, flies, dip-nets, or seines for catching minnows, he either fished from a little rowboat, anchored in a suitable location, or from some of the many points separating bays, where there was a steady movement of the larger trout.



Photograph by George Shiras, 3d

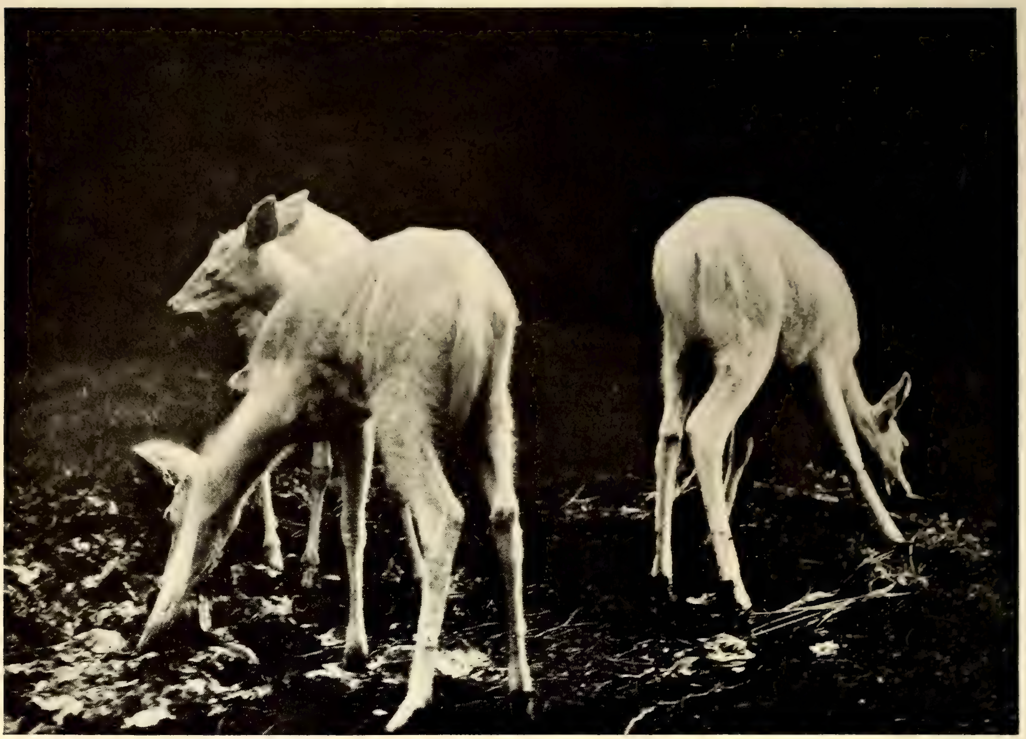
ALBINO DOE IN HEAVY WINTER COAT

She was brought from southern Michigan in 1918; eyes pink and very susceptible to light; hoofs and nostrils white (see page 183).

It seems worthy of mention that family records covering 65 years, and supplemented by other contemporaneous data, showed that the maximum weight of any trout taken was 5½ pounds, the average of the larger ones ranging from 4 to 4½ pounds (see page 131).

On the northern, or Canadian, shore the larger fish averaged about a pound less in weight, except in the Nipigon River, where specimens reaching ten pounds were not unusual.

Now that the trout along the southern shore are approaching extinction, a tragedy assured by the improvident custom of catching the remnant at the mouths of spawning streams, it is rather surprising to learn that occasionally a fish is taken weighing 6½ pounds, the explanation be-



Photograph by George Shiras, 3d

THE THREE ADULT ALBINO DOES UPON WHICH THE PERPETUATION OF THE HERD LARGELY DEPENDS (SEE PAGE 185)

The eyes of two are light gray, and the other red, in striking contrast to the black eyes of the normal deer.

ing the greater proportion of food for the few survivors.

INTRODUCTION OF THE ANGLEWORM ON LAKE SUPERIOR

The hooks used by this ancestral fisherman were long, slender, and slightly curved, allowing the tying on of different feathers well up on the shank, and including almost invariably a strip of red flannel or a piece of similarly colored yarn, beneath which was room for one or two large angleworms. In those days the use of live bait, and especially angleworms, was regarded as sportsmanlike, and apparently justified in the case mentioned, for the fish sought were those lying deep below the surface, on a rocky bottom. To hook these big fellows was only an incident in the long, hard contest with a slender rod.

Every spring, and while the angleworms were still near the surface, small boys were engaged to dig an ample supply in the vicinity of Pittsburgh, and these were taken in a two-gallon can to Lake Superior, where they were placed in a large wooden box filled with black earth and protected against a too-miscellaneous use by lock and key, for the angleworm was not to be found anywhere along the entire lake or adjoining territory. Toward the close of each season the remainder, if any, was distributed among eager applicants, and finally found an end within the gullet of equally eager trout.

"A SERPENT OF DISSENSION"

How this apparently harmless earthworm became a miniature serpent of dissension happened once when the surplus was turned over to an elder of a village church, with directions to apportion the supply equally among his associates. Some time later word came that a great row had developed over their distribution, followed by a secession of a part of the congregation and the building of another edifice.

Photograph by George Shiras, 3d

AUTHOR'S CAMP, ST. IGNACE ISLAND, NORTH SHORE, ONTARIO

Here the tents faced 160 miles of open water, where many medium-sized trout were taken within a hundred yards, but most of the larger ones became the victims of a gill net extending to the shore, ostensibly set for lake trout of the deeper waters (see page 187).

This ancient fisherman was never able to determine satisfactorily whether he was to blame for such a breach or was to be congratulated on having brought about the establishment of two churches where there had only been one before.

In 1878, on receiving a larger remnant of angleworms than usual, I planted them in the neighborhood, with the hope that in a short while the local supply would meet future demands. At the end of three years they became very abundant in this little preserve; so some were taken to Whitefish Lake and placed in rich, deep soil near old Jack's cabin. These grew to extraordinary size and far exceeded their Pennsylvania progenitors. Some reached the headwaters of near-by streams and were carried down each spring, until most of the region showed their presence.

THE ROBIN BENEFITS BY THE ANGLEWORM'S INTRODUCTION

Meanwhile Marquette had become a systematic point of redistribution, and for a considerable time the angleworm has been found scattered along the entire south shore and at either end of the lake, there still being about 150 miles in the central portion of the north shore where I have neither seen nor heard of their presence.

If the fly fishermen are no longer concerned about the coming of the angleworm, the history of their naturalization may prove of interest to the scientist.

The robin, however, is still a beneficiary, for these worms constitute their chief diet in May and June, before the coming of the berries, and are the sole food of their first brood. Moreover, it has been noticed in the last decade that the woodcock, which once stopped briefly on their migratory flight, now linger for weeks in the alder thickets near the streams where they can always find a bountiful supply.

The gardener, too, has found a friend in this little borer, for they assist in the breaking up and enrichment of the surface soil, as the casts of this active feeder contribute much toward the quality and fruitfulness of the garden patch.

The angler and commercial fisherman, together with a large part of the public,

Photograph by George Shiras, 3d

LARGE BULL MOOSE AT A SALT SPRING ON ST. IGNACE ISLAND

The saline waters came from beneath a red sandstone stratum a few hundred yards behind the camp (see page 188).

are interested in maintaining a bountiful supply of fish, high in quality and reasonable in price, justifying their support of an effort now being made to rehabilitate the fisheries of the Great Lakes.

The recent introduction of the steelhead salmon has added another fine and adaptable fish, which, spawning in the spring, can utilize the streams for this purpose, and when unoccupied by the brooding trout in the fall.

THE SPECKLED TROUT IN DANGER OF EXTERMINATION

The species found in Lake Superior are limited in number, for the depth and purity of its water and the low temperature throughout the year have barred the coarser and less desirable kinds.

At one time the speckled trout, the lake, or so-called Mackinaw, trout, and the whitefish were present in extraordinary numbers, each occupying a somewhat different portion of the lake, according to the depth and character of the water, and all living in comparative harmony. The speckled trout depended upon minnows, insects, and crustaceans near the shore, the lake trout had an ample supply of herring, while the whitefish, a bottom feeder, in nowise interfered with the others.

There was a hardly appreciable decline in the speckled trout during the fifty years herein recorded, until it was unfortunately discovered, that during the month of August all the trout living in the lake congregated in particular streams for spawning, and these localities were then visited by an increasing number, some fishermen taking in a single day a hundred pounds of sluggish and inactive fish and often salting down the surplus for winter use.

In this onslaught others reluctantly joined; for, as the fishing became poorer each season in the open waters, they yielded on the theory that if the end were approaching, one might as well have a share in the final distribution.

Photograph by George Shiras, 3d

A COW MOOSE AT THE SAME SPRING

Here a bull moose had been illegally killed by natives just before the party's arrival and its festering body soon drove the other animals away (see page 188).

The prompt termination of this indefensible practice, and the equally bad one of running gill nets to the shore, would in a very few years restore the finest of fresh-water game fish to approximately their former numbers.

WHITEFISH FISHING WANES AS HERRING INCREASES

The whitefish, especially those of Lake Superior, have been generally esteemed as the most delicious of all fresh-water species, and when the nets were few and far apart and the methods of transportation and distribution unsatisfactory, millions of pounds were taken each season, while today, with a hundred times greater number of nets, a much higher market price, and rapid means of distribution, but a fraction is caught.

The following figures, furnished by the U. S. Bureau of Fisheries, tell the story: Whitefish, 1885, 8,000,000 pounds; 1918, 300,000 pounds. Thus it is apparent that this excellent fish is commercially extinct, but with a sufficient remnant left, if protected for a while, to be restored in waters always favorable for their support.

At one time the lake trout were in little demand, for the whitefish dominated the western markets, yet even then, with a few nets set, the annual catch approached 3,000,000 pounds, so abundant were they everywhere in Lake Superior.

The fishermen of Michigan, Wisconsin, Minnesota, and western Ontario now use sail-boats, launches and tugs for gathering the daily catch, setting gill and pound nets in all parts of the lake, sometimes two hundred feet below the surface, while larger steamers collect those taken in the more remote localities.

A DOUBLE DISASTER

Notwithstanding such a combination of efforts, the present total does not equal the number so readily taken forty years ago, with the result that the proportionately greater expenses could not now be met were it not for the extraordinary number of herring taken each fall, and these figures are significant: Herring, 1885, 300,000 pounds; 1918, 8,000,000 pounds, showing how this small and much inferior species has exchanged places with the whitefish in precisely the same period.

The present rapid consumption of the herring has become doubly disastrous, for it helps financially in maintaining the fishing fleet during their concluding attack on the lake trout, and then, with the herring gone, any future effort to restore the lake trout becomes increasingly difficult, as the latter's main food supply is thus destroyed.

Would it be possible to imagine conditions better adapted for the permanent exhaustion of the game and commercial fish in the finest and largest lake in the world?

It has long been recognized that the lack of coöperation on the part of the States and Canadian provinces bordering on the Great Lakes accounts for this situation. With each acting separately and each naturally disposed to have laws equally liberal toward their local fishermen, it follows that the State or Province spending the least money in fish culture, or having the most improvident regulations and the least efficient system of enforcement, sets the pace for the others, while the governments of each country must sit supinely by, because lacking any authorized jurisdiction over international waters in which their respective citizens have a common interest.

CANADA WILLING TO REVIVE THE TREATY

It was to meet this unfortunate situation that the United States and Great Britain negotiated and ratified a boundary waters fishery treaty, but in 1914 failure of the U. S. House of Representatives to pass an enabling act, on account of minor differences of fishermen in southern Michigan and jealousy over the proposed withdrawal of local regulations, has postponed indefinitely the operation of this beneficent agreement.

It is understood that Canada is still willing to see the treaty revived by the passage of appropriate legislation if our country will now make a move in this direction.

By such coördination of authority and coöperation in activities, the problem can be readily solved; for it is not a local question in any sense, but one that is interstate, national and international in scope.

That such a conclusion is reasonable and not speculative has already been established by the Migratory Bird Treaty, under the recent operation of which our wild-fowl are being rapidly replenished, and the more valuable insectivorous birds protected permanently in behalf of the agricultural interests of each nation.

CHAPTER VI

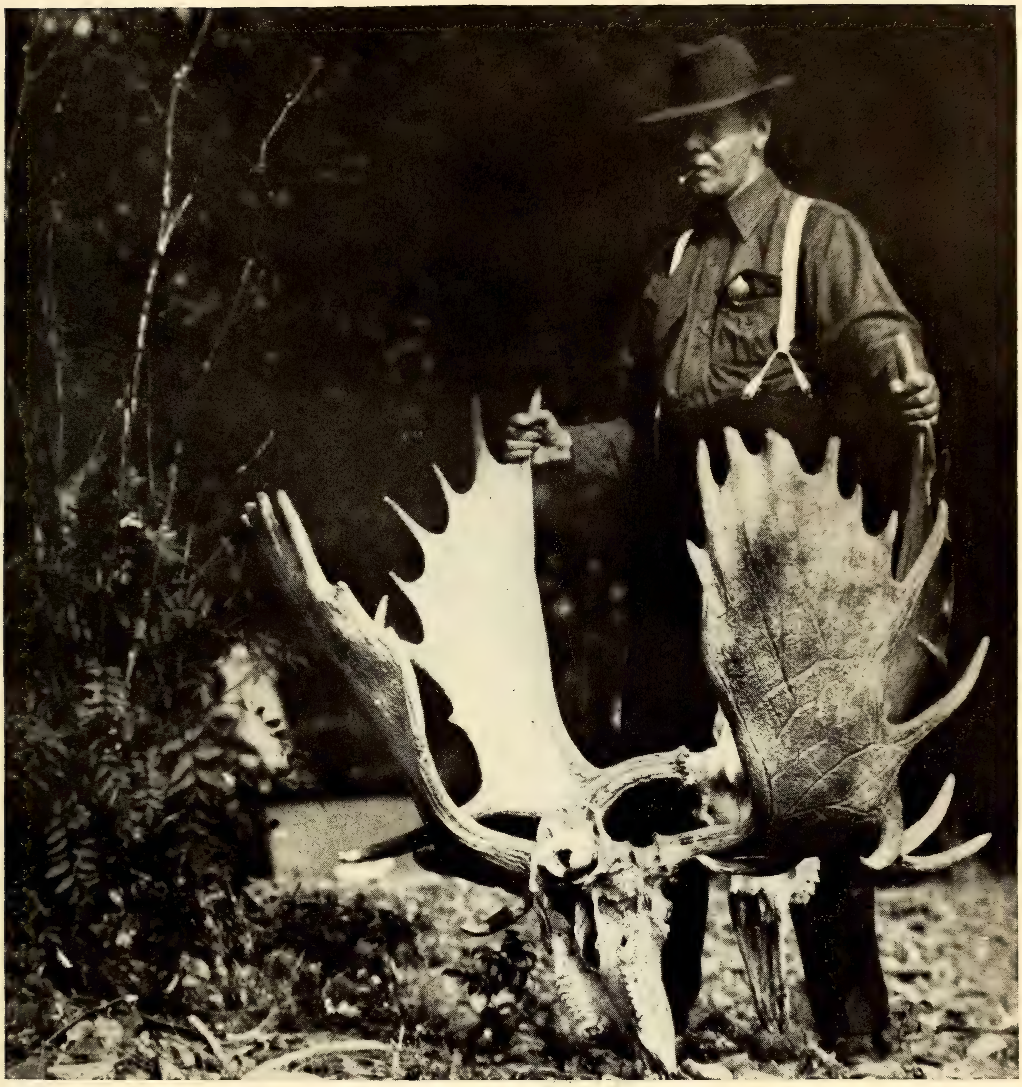
THE TIMBER-WOLF AN ANIMAL OFTEN MISREPRESENTED

From nearly every standpoint, the timber-wolf is an interesting animal, the only drawback to gaining an intimate knowledge of its habits being the extreme difficulty in finding any range where it may be successfully studied; for to a large extent its habits must be inferentially determined, this prowler of the night seldom coming under direct observation.

No animal possesses greater sagacity in avoiding its only enemy, man, and few show greater cunning and persistence in seeking their prey. If I were to be asked to give a predominating characteristic of the gray wolf, it would be its fear of man. Accustomed from our early childhood to hear of its savage nature, and seeing frequently in the press the harrowing accounts of men being pursued by these bloodthirsty creatures and escaping only by nimbleness in ascending a tree or perhaps by barricading a wilderness cabin, so conveniently at hand in such stories, it is not strange that in the popular mind the timber-wolf is still regarded as the arch enemy of man. But there is the best of proof to show that man has thoroughly terrorized this animal.

TWO GREAT CONTRASTS: THE WOLF AND THE DOG

The wolf and its descendant, the dog, present the greatest contrast in their respective attitudes toward man. One is distrustful and cunning, skulking in the shadows of the night, intent upon rending to pieces any less powerful animal, but having a dread of man so overpowering that they often die of their overexertion in desperate efforts to escape within a few hours after being trapped; and the other affectionate, loyal beyond comparison, intent upon faithfully performing



TWO PAIRS OF MOOSE ANTLERS INTERLOCKED

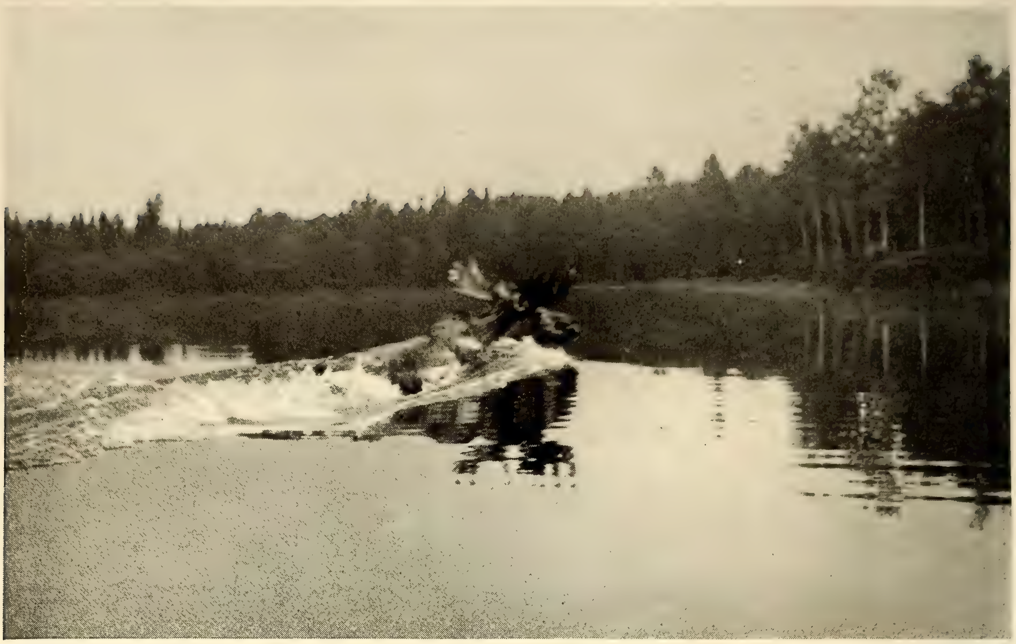
Each of fifty inches spread, inextricably joined in the deadly rivalry of the mating season, where both contestants were vanquished forever. Found near the center of St. Ignace Island (see page 188).

every service as a companion or assistant in the labors or pleasures of the day, representing the highest and most intelligent response to kindly treatment. Reversion from dog to wolf begins under a cruel master or when half starved and ill-treated by the many barbaric tribes employing the dog as a mere beast of burden.

The wolf has had every occasion to fear his human foe, for it has been trapped, poisoned, snared, shot, harassed by hounds, and a price placed upon its head. The survivors know that however much the other animals of the forest may stand in awe of them, man is ever their relentless and successful enemy, and only by the exercise of all their highly developed senses can they hope to escape the same miserable death they so ruthlessly inflict upon their prey.

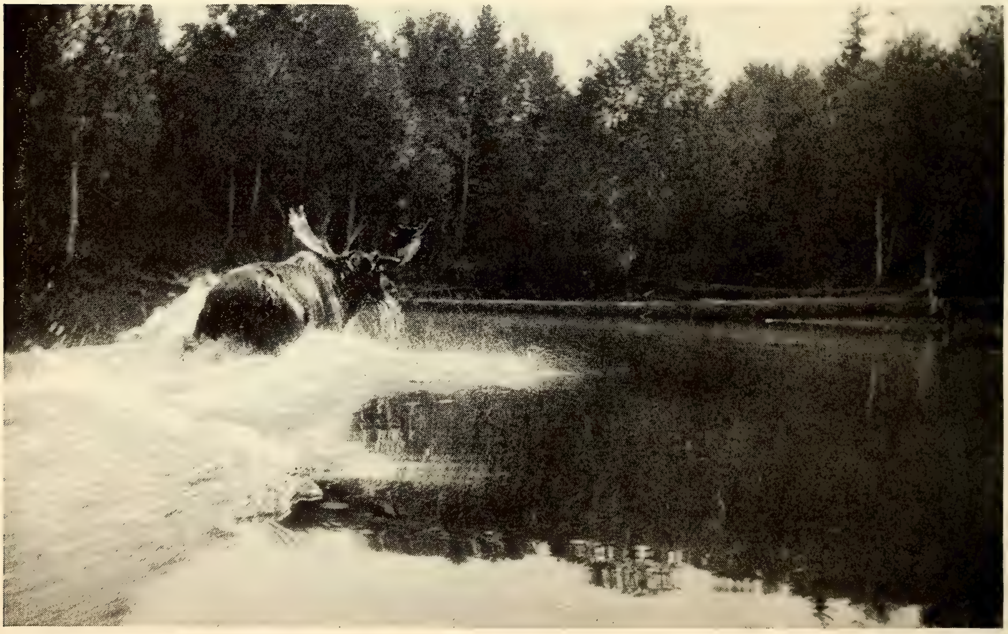
THE COURAGE AND FEROCITY OF THE WOLF GREATLY EXAGGERATED

In the years spent in some of their many ranges on the northern continent, I have never seen more than twenty wolves,



IT REQUIRED THREE PADDLERS TO KEEP ABREAST OF THIS STURDY SWIMMER

Who was feeding on water plants eight feet below the surface when disturbed by our approach (see page 188).



Photographs by Paul Switt

BREAKING THE SPEED LIMITS!

Same bull approaching the shore. Both pictures were taken with a small hand camera by one of the anglers of the party, showing what can sometimes be accomplished with a small instrument.

Photograph by George Shiras, 3d

A BEAUTIFUL LAKE ON ST. IGNACE ISLAND

This lake, four miles long and nearly dividing the island, is the largest of some fifty ponds and lakes. The western shores are high and rocky and the eastern low, with shallow bays, where forty moose were seen in two days. Many of the animals feed on the water plants, six feet below the surface. While the forests look dense, all the lower limbs have been eaten by the moose (see page 187).

although hearing them howl upon hundreds of occasions and seeing their tracks in every direction.

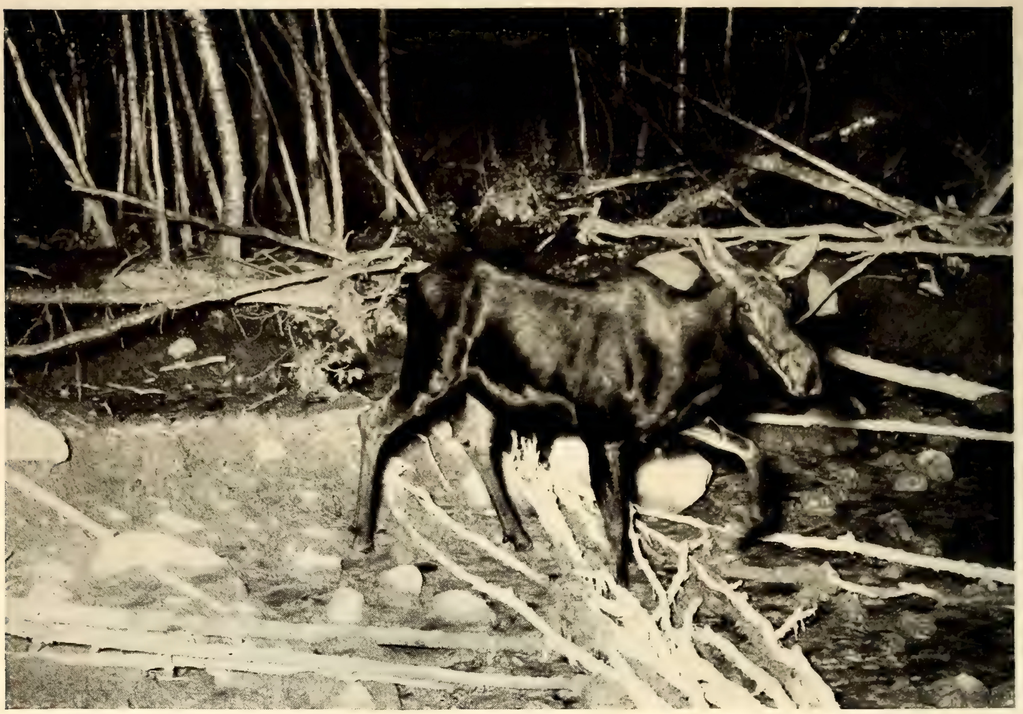
Northern Michigan was, and still is, one of the favorite resorts of the timber-wolf, owing to the dense forests and the abundance of deer and rabbits. Here I have shot a few and trapped or poisoned a dozen or so about the camp, a favorable record, considering that of the myriad of hunters roaming this section every fall, many of them, in more than half a century of hunting, have yet to see or kill their first wolf, although they number thousands about Lake Superior (see page 133).

Nowhere in America have I ever been able to get an authentic account of a man being deliberately pursued or injured by a wolf, although out of the multitude of such stories it may be that one or two are true, for the possibility always exists of an individual animal lacking the caution of its forebears or where living in a totally uninhabited country it has not inherited any suspicions of man.

Probably the most conclusive proof of the wolf's fear of a human being is the fact that every season thousands of deer carcasses in the Lake region are left over night on the ground or hung from a branch within reach, and yet are undisturbed because of the slight scent left by the hunter. Even the entrails remain untouched until all human trace has disappeared.

A WOLF SHUNS A DEER THAT MAN HAS TOUCHED

Venison is the principal diet of the Lake Superior timber-wolf, for they think and dream about it from puppyhood days, yet these keen-nosed creatures, when the air is filled with bloody odors, refrain from touching the unguarded carcasses. This should convince the most skeptical that such an animal on detecting the presence of a traveler in the woods is not likely to attack him in the flesh, since it shrinks in terror whenever discovering anything indicating human scent about a slain deer.



Photograph by George Shiras, 3d

NIGHT PICTURE OF A COW MOOSE TAKEN BY SET CAMERA AND FLASHLIGHT

This basin of clay, impregnated with salt, had been eaten five feet below the surface. Note absence of lower branches (see page 187). A quantitive analysis of the water showed: calcium oxide, 376 parts; magnesium oxide, 22; potassium chloride, 17; sodium, 615; total chlorine, 576 parts.

Such fictitious tales never come from reliable sportsmen or from experienced trappers, but are circulated by lumberjacks, land-lookers, homesteaders, inexperienced hunters, and by sensational writers, unable to tell the difference between the hoot of an owl or the cry of a loon from that of a wolf, and, besides, are ever prone to imagine or enlarge upon the supposed perils of the forest.

Twice, however, I have had a carcass of a deer eaten by wolves when left out overnight—once where the animal was shot across a small lake and I did not go to it until morning, when I found only a few scattered remnants, and again, when trailing a wounded buck in the snow, the search was suspended at dusk, and on renewing it the next morning I found several wolves ahead, but beyond where I had stopped the night before. In a few minutes there came in view the blood-stained snow, and only the bones stripped of flesh remained. In both instances there was, of course, no trace of human scent, so the wolves had no hesitation in devouring the carcass.

A WOLF THAT DIED OF FRIGHT

On one occasion, many years ago, wolf tracks were seen on the sand beach at the end of Whitefish Lake; so a large steel trap was set in the water of the creek where a deer runway crossed it, and the same night I heard a wolf howling in that direction.

In the morning, on entering the slough, I fired at a pair of black-ducks passing overhead, and on reaching the place where the trap had been set, found it gone, some of the alders in the vicinity being uprooted, caused by the temporary catching of the clog. Upon reaching the opposite bank I found other alders had been torn to shreds, many of them still dripping with blood from the torn mouth of the wolf as it frantically tried to escape.

Believing a rifle might be needed in the more open ground, where the clog

Photograph by George Shiras, 3d

VIEW OF AUTHOR'S CAMP FROM THE SWIMMING POOL: WHITEFISH RIVER

The pictures of deer and other animals in the garden were taken between the two upper buildings shown on either extreme, while the beaver, muskrats, mink, and raccoons, as well as some deer, entered by the river front (see pages 188-193).

could be dragged readily, I returned to the camp for one. Taking up the hunt again, I soon noticed a large wolf lying on the ground with its head between its paws, almost as if asleep. On approaching the animal it was found to be dead, its body still warm.

It had probably been held fast by the clog when it heard the shot fired at the ducks, which accounted for the bloody alders, as the animal frantically renewed its efforts to escape. On reaching the hilltop the accumulating terror of its position undoubtedly resulted in death.

THIS WOLF COLLAPSED WHILE BEING PHOTOGRAPHED

That this instance is not exceptional was proved three years later in the same locality, where a wolf was trapped one night and again it howled. On the following morning, with rifle and camera, I visited the spot. The trap was missing, but the animal had not gone more than twenty yards when the log attached to the chain caught, and as I approached, the wolf raised itself to a sitting position. While I was clearing away the thick alders for a picture, it sank to the ground, with every appearance of complete exhaustion, and only by a severe prodding would it arise.

On the first snap of the camera, the animal collapsed, refusing to stir again. I certainly never expected to be sorry over the plight of such a marauder; but its bloodshot eyes, protruding tongue, the entire lack of resistance, and the dreadful sight of the broken skin clustered white with the eggs of the blue bottlefly would have appealed to the sympathy of its most relentless enemy; so a shot hastened the end.

From its condition it was plain that the animal was in the throes of death, due not to any injury, but to an overpowering mental strain, producing a complete physical collapse, and that, too, of an animal weighing eighty pounds and in the best of physical condition.

RESOURCEFULNESS OF THE TIMBER-WOLF

An illustration of the elusiveness and endurance of the timber-wolf occurred when one was found on Grand Island, in the fall of 1896. The first snow showed its presence, besides disclosing a large number of deer carcasses, including several of the imported black-tails.

Thereupon a large number of traps and poisoned bait were set out, but without result.

Then, to insure its destruction, a dozen of the best shots in the vicinity were em-

Photograph by George Shiras, 3d

A LARGE MINK TAKES ITS OWN PICTURE AT NIGHT

This is a representation of the animal that took, on a number of successive days, a victim from among the white ducks in the swimming pool, Whitefish Lake (see page 190).

ployed to hunt the animal. Taking up the trail in the snow, it was followed continually in the daytime for four days, when the animal was slightly wounded, which only increased its watchfulness.

At the end of nearly two weeks, with relays following it all day and sometimes at night with lanterns, the wolf was finally killed. With the wages paid and the loss of deer destroyed by this single animal the cost was estimated at $1,500.

That an animal on an island, where it could be readily followed in the snow, was able to escape such a number of experienced hunters during this length of time shows how hopeless would be a similar pursuit on the main shore, where the avenues of escape are infinitely greater.

In the past fifteen years the coyote unexpectedly appeared in northern Wisconsin and Michigan, coming from Minnesota. It has since become very numerous, feeding on rabbits and killing many young deer, besides threatening the sheep introduced in the cut-over lands.

Some twenty of these animals have already been trapped on Grand Island, a game preserve described in subsequent pages, and many are taken each year to the mainland. In weight they exceed those of the prairies, evidently responding to the heavily wooded area and the nature of their prey.

CHAPTER VII

USE OF THE CAMERA IN THE DAYTIME

In previous issues of this Magazine* I have described with considerable detail

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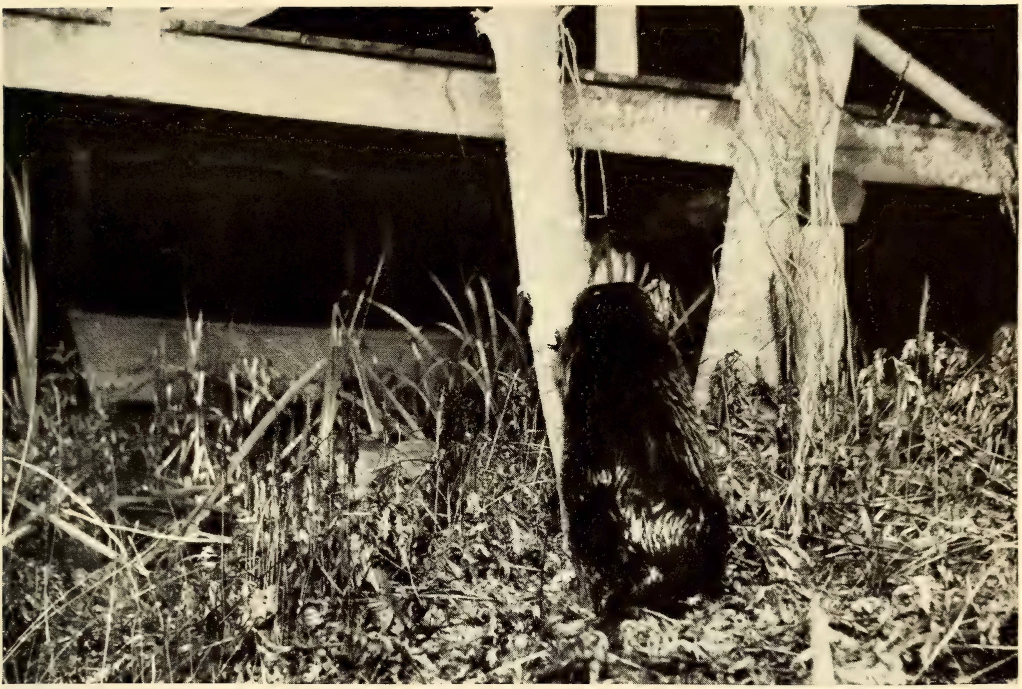
* See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Wild Animals that Took Their Own Pictures by Day and by Night," July, 1913; "A Flashlight Story of an Albino Porcupine and of a Cunning but Unfortunate Coon." June, 1911; "One Season's Game-bag with the Camera." June, 1908, and "Photographing Wild Game with Flashlight and Camera," July, 1906.



Photograph by George Shiras, 3d

A BEAVER VISITING THE BOAT-HOUSE IN FRONT OF CAMP: WHITEFISH RIVER

This large beaver discovered a couple of young black ash and was tempted to visit the camp clearing. Where is its tail? At no time in six years have the river beavers been seen in daytime (see page 190).

the methods employed in nature photography, both by day and night, but have omitted largely the history of its gradual development, or how it has been used by the naturalists and sportsmen as an aid to science or the establishment of a new pastime; so some additional information is not out of place.

In looking over my diaries, beginning in 1878 and continuing to date, the following brief entry appears in 1886:

"WHITEFISH LAKE, *July* 7-9.—First day wounded bear on the way out; saw two deer in camp clearing. Second day photographed a deer. Guide, Jake Brown."

At the time indicated I owned a 5 x 7 landscape camera with a single lens, of slow speed, which had to be uncapped when an exposure was made; so a tripod was generally necessary. In some respects this instrument proved more satisfactory for scenic pictures than the modern outfit, for the use of the tripod in focusing and in the study of the field to be included, besides the small aperture of the diaphragm, resulted in well-defined negatives and also precluded the carelessness so customary with a snapshot camera.

When the time finally came that the vacation was limited to the summer months, with an occasional brief hunt in the fall, the opportunity for outdoor sport was greatly reduced, but the "call of the wild" became intensified by the confinement and exactions of city life.

On these summer trips, in seeing the wild animals in the woods and about the waters, there was a lamentable lack of the interest aroused when the gun was in use. To paddle within range or cautiously approach some clearing and then see an animal slink away became monotonous to one accustomed to a keener and more exciting sport.

THE FIRST ATTEMPT TO PHOTOGRAPH A DEER

Likely it was this feeling which led to my suggesting to Jake Brown (the worthy successor to Jack La Pete) the possibility of photographing a deer. So one afternoon the flat-bottomed hunting

Photograph by George Shiras, 3d

A VARYING HARE IN A STRIKING ATTITUDE

Rarely is this animal seen in sunlight, for it feeds by night, but the white clover in the camp garden made it a frequent daylight visitor (see page 190).

skiff was prepared for the experiment, with a few green boughs in front screening the camera.

On entering the lake, an unusually large buck was seen standing upon a submerged rock opposite. Paddling through the reeds slowly, we came to open water fronting the animal, and as the bow cleared the reeds we were within forty feet of it, as it stood in a striking attitude. At this instant the boat, fortunately, ran on top of a sunken log, steadying it for the picture.

Quickly the cap was removed from the lens and then replaced. The deer, however, detecting this slight movement, ran a short distance, when it stopped, with head high in the air, gazing anxiously in our direction.

TWO PICTURES SPOILED AT ONCE

Meanwhile I had replaced the slide, reversed the plate-holder, and had time to make a second exposure, when with a single leap the animal cleared the bushes fringing the water.

More excited than if I had killed this splendid specimen, the slide was picked up to cover the last exposed plate, when I was stunned at seeing the light-colored negative staring me in the face, for I had withdrawn the outer slide while watching the deer moving off, thereby destroying the first negative and not exposing the second.

Jake, of course, could not understand how it was possible to spoil two pictures by a single mistake; so, without any undue discussion about the manner in which I had blundered, the boat was headed for the slough, where a large doe was ready for the next effort. Somewhat suspicious of the partly screened boat, she allowed time for the removal of the cap, but before it could be replaced she ran back into the forest. On developing the plate, there could be seen the faint outline of the doe, and then a long white streak representing her retreat.

Following this short experience, it was apparent that only by the best of luck was it possible to get pictures of deer with such an outfit, and while just such luck had favored the initial effort, "buck fever" of the earlier days had brought almost complete failure.

THE FIRST PHOTOGRAPHIC APPARATUS OF ITS KIND

Several seasons previously, a friend of mine had procured a 4 x 5 outfit, called the "Schmidt Detective camera," having a high-grade, rectilinear, Dallmeyer lens, with a fairly rapid shutter, which could be set and released by a string and button on the outside of the box. This apparatus, which was the first of its kind, equaled the modern ones in effectiveness, and for my purpose proved very much better, for the plate-holders and lens were inclosed in a light, tight, waterproof box.

Using this camera, during the next season I was able to get several good pictures of deer. The lens, however, was of short focus, so it was necessary to get within about twenty-five feet of an animal for satisfactory results, and this was difficult in bright sunlight. So then I tried sitting in a blind near a runway or

Photograph by George Shiras, 3d

A GREAT BLUE HERON OPPOSITE THE AUTHOR'S CAMP

Frogs in the reedy shore across the stream attracted the blue herons, but the camp was watched closely by these cautious birds, Whitefish Lake (see page 190).

where the deer came to feed, but the shifting currents of the air usually indicated my presence before the quarry approached close enough, showing the difference between shooting an animal some distance away and trying to photograph it within a few yards.

ANIMALS MAKE THEIR OWN PORTRAITS

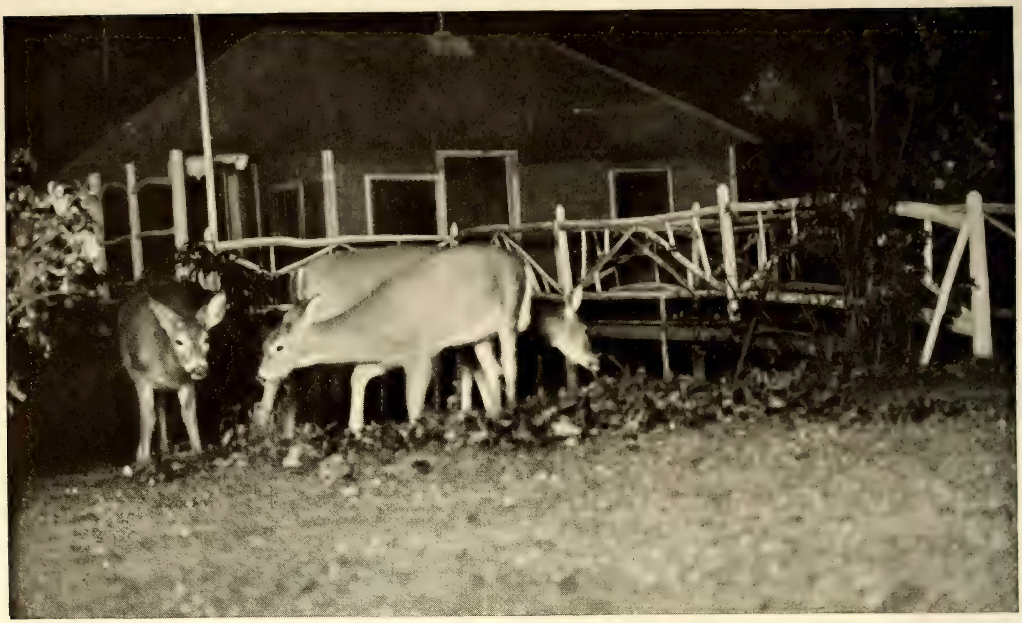
During subsequent seasons this difficulty was overcome by running a thread across a runway or the beaches, with the camera concealed a short distance away, and in this manner pictures were obtained without effort and of very excellent quality. Later, when leaving the camera out all day, it could be reset for night with a flashlight, and thus it was at work twenty-four hours—an important advantage when in the remote wilderness for a brief time.

Another method was to place two or three cameras in different parts of the slough, and when an animal passed in front of one the shutter was released by pulling a string suspended through screw-eyes on saplings and running thence to a scaffold in a tree overhanging the water, where I could release the shutter of a camera by pulling the right string, the deer always stopped when I gave a shrill whistle (see page 134).

It seems odd now that in the beginning I had selected as an object for the first camera hunts the most cunning and elusive of the deer family instead of trying an easier subject, like a porcupine, a squirrel, or some of the many semi-tame birds nesting in the clearing about my camp. Of course, the explanation lay in the fact that I simply wanted to hunt deer, and the camera gave the means of gratifying this desire.

A QUOTATION FROM THE PAST

Soon the real and lasting merits of this instrument as a sportsman's adjunct became more and more apparent, and in such belief I wrote in advocacy of this new pastime an article published in 1891. It indicates a violent reaction against useless destruction, but it at least bears witness to a confidence in the camera as the sportsman's best friend.



Photograph by George Shiras, 3d

A DEER FAMILY FEASTING ON MOUNTAIN-ASH BERRIES BEFORE THE BOAT-HOUSE

These wild berries were so placed that deer passing toward the garden would fire the flashlight, showing the boat-house in the background (see page 191).

"A sportsman's life consists largely of three elements—anticipation, realization, and reminiscence. The look forward to the trip by rail, by canoe, and then perhaps a tramp on foot into the heart of the wilderness; then the camp and its pleasant surroundings, and that memorable day when the early morning sun casts a glint upon the branching antlers of a mighty moose as, half concealed in the thicket, he furtively browses his way along; the breathless wait until the neck or shoulder becomes exposed; the shot, and then—success—that is, sudden death, or perhaps delightfully intensified by a hasty scramble after the wounded beast on a blood-stained trail, at the end of which we find our victim dead or dying.

"Would that we could realize that what is game to the rifle is game to the camera! Nearly every sportsman will admit that the instant his noble quarry lies prone on the earth, with the glaze of death upon the once lustrous eye, the graceful limbs twisted in the rigors of death and the tiny hole emitting the crimson thread of life, there comes the half-defined feeling of repentance and sorrow.

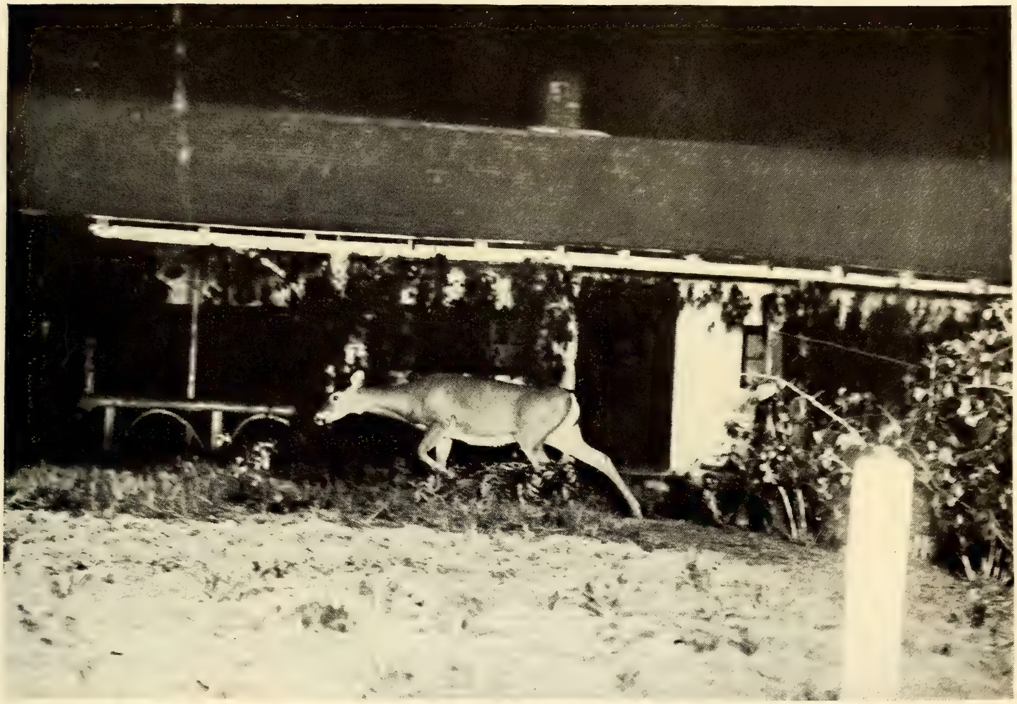
"The great desideratum, after all, consisted of neither meat nor antlers nor hide. Therefore the conclusion is reached that much of the large game, when successfully hunted, is the victim of an abnormal incentive.

"Surely we do not travel a thousand miles, indifferent to time, labor, and expense, to get a few hundred pounds of wild meat, probably not half so toothsome as the domestic cuts in the market stalls of our own town and costing very much more.

THE THRILL OF THE CAMERA HUNT

"Every camera hunter will admit, even though once a successful sportsman, that there is more immediate and lasting pleasure in photographing a deer at twenty yards than in driving a ball through its heart at one hundred yards. Then, think of the unlimited freedom of this noiseless weapon. No closed season, no restriction in numbers or methods of transportation, no posted land, no professional etiquette in the manner of taking your game.

"You can pull on a swimming deer or an elk floundering in the snow; take a crack at a spotted fawn; bag the bird in its nest or string your cameras out with a thread across the runway and gather in



Photograph by George Shiras, 3d

VISITING THE CARROT PATCH

This doe selected its favorite vegetable within ten feet of the cabin containing the dining-room, wherein many a haunch of venison has been served during the hunting season. At no time are these night visitors seen in or about the garden in daylight. Cautious as they are, many of them lose their lives in the hunting season, a few months later, in which hunts the writer no longer participates (see page 191).

the exposed game-laden plates at nightfall without any scruples of being called a pot-hunter.

"By and by you will have a collection of pictures affording more enjoyment than all the mental ghosts of slaughtered quadrupeds and all the moth-eaten relics of the gun; for, when one covers an elk or a moose with his single barrel, close shooting, long-focus lens, there is no pulling off the hide while the coyote and the birds of prey feast on a thousand pounds of meat too rank in the rutting season for food or too cumbersome, if edible, to be generally available.

"In each essential particular the camera requires all the proficiency and affords all the pleasure that a steady hand and a deadly weapon ever gave a lover of field sports, and more besides.

"It is only within the last few years that compact photographic appliances, quick shutters, rapid dry plates and films have made possible successful work on large game, or otherwise some of us might have reformed before."

Whatever may have been the writer's particular contribution toward wild-life photography in the daytime, it was of a non-essential character, so far as the immediate future was concerned, for the method would soon have developed naturally on the coming of proper apparatus.

A year or two later Wallahan, of Colorado, on his own initiative and with an ordinary tripod camera, succeeded in getting a remarkably beautiful series of the mule deer during their descent from the mountains each fall, and later, with better equipment, photographed many other animals in his State.

Then Chapman, our leading ornithologist, began picturing birds, his collection not being surpassed by any individual at the present time; followed by Kearton, of England, who soon became the foremost bird photographer across the seas.

The next effort of the writer was to

try photographing animals at night by flashlight, about the waters in the vicinity of his camp. In this experiment many difficulties arose, which may best be considered as a separate subject.

WILD LIFE PHOTOGRAPHY BY NIGHT

In the earlier days, about Lake Superior, the old Indian method of "fire-hunting" deer proved most fascinating. True, this practice has long been outlawed as unsportsmanlike, since it required little skill and became very disastrous when followed systematically by market hunters.

Even at that time, the real pleasure in hunting at night, to most of us, was not so much the actual shooting as the keen enjoyment derived in paddling quietly along the winding streams or the well-wooded shores and bays of some inland lake, where in the quietness of the night every sound was audible, and one readily learned to know the different animals before they came within the circle of the light.

Unless the primary object was obtaining meat for camp, it was disappointing if a deer were killed within the first half hour, thus ending the trip.

Another method of night hunting was the use of a headlight on shore, the hunter quietly wandering about in the blackness of the forest looking for a pair of gleaming eyes, fifty or more yards away, and then with a rifle trying to put a ball between the few inches separating these brilliant orbs, requiring an accuracy of aim, a knowledge of the woods, and a skill in still hunting quite up to the standard in daylight shooting.

But here again the market hunters became so proficient under conditions already described that this method also had to be prohibited.

THE IDEA OF NIGHT PHOTOGRAPHY CONCEIVED

Having taken daylight pictures of deer in various ways, the question then arose whether there was any possible means of doing this at night, when the deer were much more active and could be approached more easily than at other times, thus reviving, in a harmless but interesting way, jack-light hunting, so little known by those of the present day.

Assured by an extended experience in both methods of hunting under the light, there seemed little doubt about getting close enough for pictures, provided the magnesium powder was a sufficiently powerful illuminant and had the requisite speed.

"SHOOT THE DEER FIRST"

This new endeavor was mentioned to Jake Brown in the summer of 1889, but he was still a trifle irritated over an experience of the previous fall, when, after the season had opened, I photographed a fine buck and shot at it afterward, resulting in badly wounding the animal as it ran away, entailing a half day's search before it was overtaken and put out of misery, for the lower jaw had been crushed by the rifle ball, giving a pitiful illustration of how some animals must suffer in the name of sport.

This led Jake to exclaim that if the camera must be used, the best thing to do was to shoot the deer first and photograph it afterward! However, as the season would not open for several months, he got the boat ready for the night, while I attempted to devise some sort of a flashlight apparatus.

A small hole was made in the center of a tin plate, in which was placed a strip of oiled paper that would burn readily when ignited underneath, and on top was placed the magnesium powder.

The approach was to be made in the usual way, with a jack-light.

FIRST ATTEMPT PARTLY SUCCESSFUL

This first effort was entirely successful, so far as getting within range; but just as the lower end of the paper fuse began burning, the deer ran off with a snort of disapproval, the flash taking place after it was out of sight. Jake, as might have been expected, indulged in his usual guffaw, while I hopefully began preparing another charge.

At the left-hand corner of the sand beach stood a large doe, much interested in the approaching light, and soon the boat came within 25 feet, the flashlight being fired when the animal was apparently motionless.

On developing the negative the body of the deer was satisfactory, but the head had moved so violently the animal seemed decapitated.

Photograph by George Shiras, 3d

FINISHING UP THE BRUSSELS SPROUTS

This deer took its picture at midnight before the cottage of the caretaker, whose sleep was doubtless momentarily disturbed by the explosion. But, as such raids were a continual strain on the temper of the gardener, he always welcomed the sound of the flashlight (see page 191).

This unexpected result was discouraging, so several trials were made the following night; but again the pictures were nearly worthless, for the same reason as the first, showing that the powder was too slow for an active creature like a deer when facing a slowly exploding illuminant.

Later experiences proved, however, that even with this crude apparatus a good picture might have been taken occasionally had the flashlight been discharged when the deer had its head down or was turned away from the water.

During the ensuing winter I learned of a flashlight apparatus designed for taking pictures in theaters, ball-rooms, or other large interiors, consisting of a metal standard supporting three circular alcohol lamps, into the flames of which could be projected a spray of magnesium powder by means of a rubber bulb connected by tubing with a receptacle containing enough powder for half a dozen flashes.

This apparatus, with its great power of illumination and ease of manipulation, seemed suitable for solving the problem.

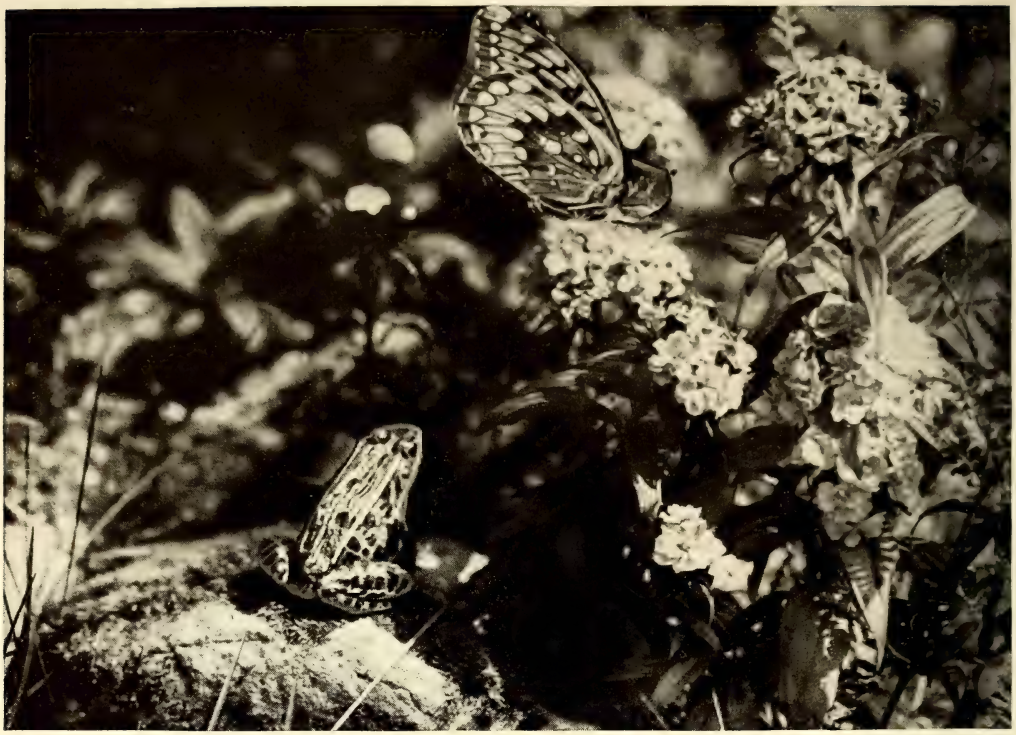
UNEXPECTED PYROTECHNICS

On the first dark of the moon the following July I left camp in a canoe with the new outfit in the bow and the ever-faithful Jake astern, going downstream from camp to avoid the winds of the open lake.

A reflector had been placed behind the three lamps with the idea of covering the jack and utilizing the other light when finally approaching a deer.

In one place it was necessary to lift the canoe over half-submerged rocks; but, as we both wore gum boots, this was easily done. Shortly afterward it was realized that this little portage had probably saved the flashlight hunter from severe injuries.

On rounding the next bend a pair of



Photograph by George Shiras, 3d

A DOZEN FROGS CATCH NEARLY ONE THOUSAND BUTTERFLIES

Early in August, 1919, the half dozen little Leopard frogs living in the camp water garden near Whitefish Lake were seen catching, every few minutes, butterflies known as "the little white-banded blues," as each alighted on a row of forget-me-nots bordering the water. Frequent observation during a week indicated the killing of fully 500 butterflies. On the bank of the stream was a bed of sweet-william, where another set of the little green frogs lay in wait, these catching a brown species (shown above) almost as frequently. It is worthy of note that two distinct species of butterflies fed exclusively on two different species of domestic flowers. The brown butterflies, however, fed by the hundreds on joe-pye weed along the stream, but beyond reach of the frogs. The photograph was made from above, causing the butterfly (*Argynnis aphrodite*) to appear disproportionately large.

glowing eyes attracted attention, and in a moment the three lamps were ablaze and the jack-light covered. On approaching, the deer jumped to one side, requiring the canoe to change its course, for I had not then in use a revolving table capable of covering any quick movement of an animal.

In turning to whisper instructions to Jake, my elbow unfortunately caught on the rubber tubing, toppling the entire apparatus into the bow, where the cap of the reservoir became detached, permitting the escape of all the powder, part of which clung to the wet surface of the rubber boots, the remainder going into the bow, where a portion was set on fire by the overturned lamps.

There was a tremendous explosion of the drier powder, and the damper portion gave forth a brilliant spluttering, compelling me, in a cloud of stifling smoke, to leap overboard in order to extinguish the blaze on the boots and later in the boat.

Having been turned toward the paddler when the mishap occurred and because much of the powder was wet, my eyes were protected, affording an early warning in the handling of such an explosive.

JAKE GETS A DUCKING

When Jake learned that no particular harm had been done beyond the puncturing of a chimerical scheme, he gave vent to unrestrained mirth. Standing waist deep in the slowly moving current, my hands smarting from the touch of the flames, and the little camera floating about in the murky waters, any humor in the affair was not particularly noticeable to at least one member of the party.

Opening the cover of the jack-light and turning the rays toward the stern, the sight of Jake in a state of hilarity, with a superabundance expressed by whacking the paddle on the water in rhythm with each outburst, I gave an upward pull on the already-elevated bow of the canoe, and down went the stern to the bottom, only Jake's eyes showing above the surface, stifling every sound except a little spluttering.

As Jake struggled to his feet, a grinning countenance showed his willingness to take good-naturedly this somewhat rude form of reprisal. In a few minutes the boat was ashore, the water removed, and the camera found on a near-by sandbar. While returning, my now sympathetic assistant attempted a diversion by pointing out in graphic language how surprised the deer must have been "when the moon blew up," but the monologue was not interrupted.

A SUCCESSFUL FLASHLIGHT APPARATUS IS DEVISED

In the succeeding months experiments were made with a new powder, called Blitz-pulver, a compound possessing great brilliancy and rapidity, and only requiring an apparatus that could be quickly and safely handled to insure satisfactory results.

Sportsmanlike, the idea of a pistol flashlight then suggested itself.

During the winter I had made a tin box an inch deep and seven by four inches wide, containing an iron bed-plate on which a spring-actuated firing-pin could be released by a trigger beneath the box, using for ignition a capped, but empty, pistol cartridge, which extended through an upright shoulder far enough to penetrate an opening in a pill-box containing half an ounce of powder.

This contrivance, when tested, showed it could be fired with the quickness and certainty of a gun, the strong metal bed-plate protecting the hand when the machine was held overhead.

On next returning to camp in the summer of 1891, I found that Jake would be occupied several months building a hunting cabin for a relative of mine on a little lake several miles to the west; so the next experiment had to be tried with a different paddler in the stern.

Fortunately, a good substitute was at hand, for some years previously I had employed, occasionally about the camp, but more frequently in fishing along the shore, a Norwegian named John Hammer. Although a machinist by occupation, since coming to this country, in the early eighties, his racial fondness for the water led his employers to take him on camping trips, where his expertness as an oarsman, a paddler, or in running a naphtha launch finally led him to act as a guide during the summer and fall months.

Sending for John, I explained that he was to take on a novel occupation, that of "a flashlight guide," and for an indefinite period, little anticipating his continuance in that capacity to the present date, a period of more than thirty years and covering expeditions throughout much of the northern continent.

John accepted this invitation with surprising cheerfulness, for in those days the idea of using a camera instead of a gun did not take very well with most guides, who naturally thought that in hunting big game there should be something more substantial to show than the image of what, in the flesh, represented a fine stew or roast.

Perhaps part of the explanation lay in the fact that at his own former home in Christiania he had served as an apprentice in an optical works and had always felt a considerable interest in photography, thereby viewing his new duties with a seriousness and appreciation speaking well for my future efforts.

One night about the middle of July, in the following year, the new apparatus was put into the canoe and a start made up the river under the confident belief of a greater measure of success than had heretofore fallen to my lot.

THE FIRST SUCCESSFUL FLASHLIGHT OF A DEER

On the way to the lake several deer bounded off, but too far away for a picture. Passing along without looking for any animals in the reeds, as the open shore of the slough afforded a less obstructed view, we entered it with no idea of seeing a deer for several hundred yards, and were, therefore, surprised on discovering a pair of shining eyes of what proved a yearling buck, only a few feet beyond old Jack's landing, where, as a boy, I had brought in triumph a little buck as the first victim of the gun.

What a coincidence if, on the same spot, I could now obtain an image much more lasting than the vanished one of years ago!

The deer viewed the approaching light with unusual curiosity, raising and lowering the head as if to look under or over the jack-light. Just as the neck was craned and the head elevated, the flash was fired, the camera hunters and the deer being equally blinded, for at that time we had not learned the advantage of closing one eye when the explosion took place.

Before our vision had returned the deer was heard struggling through a mass of alders, and then, without making another trial, we hastened to camp, where the developed plate showed the little buck in the center of the scene, with a foreground of reeds and a background of alders and cedar, depicting the first successful effort in the recording of an animal on its midnight rambles (see page 135).

THE LURE OF NIGHT HUNTING WITH A CAMERA

Having, therefore, learned in the succeeding year that night hunting with the camera possessed a greater attraction for the average sportsman than when the object was the death of the animal, I endeavored to show this through the columns of an outdoor magazine, and as a part of the present record its reproduction may be in order, especially as these early views have been more than sustained in the twenty-five succeeding years:

"Selecting a dark, warm night, a flashlight hunter prepares his cameras, lights the jack-lamp, loads his flashlight apparatus with magnesium powder, and in his canoe pushes out into the silent waters of the lake or river. The paddle sends the slight boat ahead so easily that no sound is heard except a gentle ripple, unnoticeable a boat's length away. The wooded banks are wrapped in deepest shadow, only the sky-line along the crest showing their course.

"At the bow of the boat the bright eye of the jack-light is turning from side to side, cutting a channel of light through the waves of darkness, showing, as it sweeps the banks, the trunks of trees and tracery of foliage with wonderful distinctness.

"Soon the quick ears of the men in the boat detect the sound of a deer feeding among the lily beds that fringe the shore. Knee-deep in the water, he is moving contentedly about, munching his supper of thick green leaves.

"TWO BRIGHT BALLS SHINE BACK"

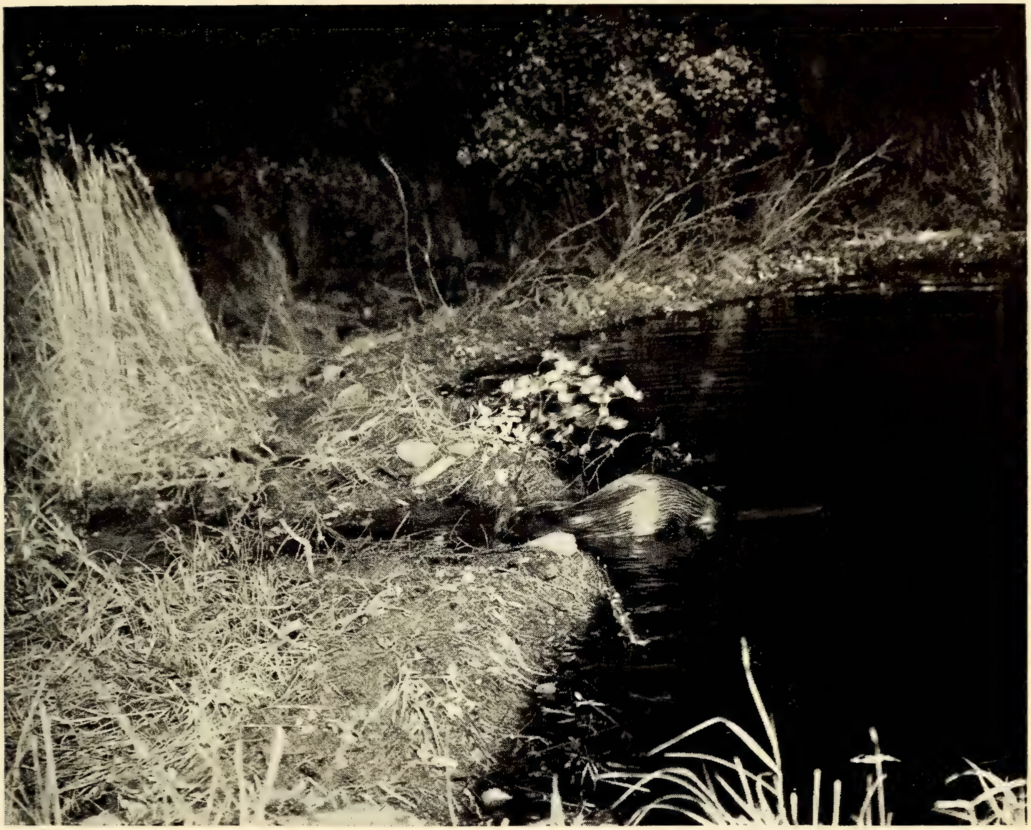
"The lantern turns about on its pivot and the powerful rays of light sweep along the banks whence the noise came. A moment more and two bright balls shine back from under the fringe of trees; a hundred yards away the deer has raised his head and is wondering what strange, luminous thing is lying out on the surface of the water.

"Straight toward the mark of the shining eyes the canoe is sent with firm, silent strokes. The distance is only seventy-five yards, now it is only fifty, and the motion of the canoe is checked till it is gliding forward almost imperceptibly. At this point, if the hunting were with the firearm, there would be a red spurt of fire from under the jack-light, and the deer would be struggling and plunging toward the brush; but there is no sound or sign of life, only the slowly gaining light.

"Twenty-five yards now, and the question is, Will he stand a moment longer? The flashlight apparatus has been raised well above any obstructions in the front of the boat, the powder lies in the pan ready to ignite at the pull of a trigger; everything is in readiness for immediate action. Closer comes the boat, and still the blue, translucent eyeballs watch it. What a strange phenomenon this pretty light is! Nothing like it has ever been seen on the lake during the days of his deerhood.

"A CLICK, A WAVE OF LIGHT, THEN DARKNESS"

"Fifteen yards now, and the tension is becoming great. Suddenly there is a click, and a white wave of light breaks out from the bow of the boat—deer, hills,



Photograph by George Shiras, 3d

BEAVER REPAIRING DAM AT NIGHT

For the purpose of showing a dam and the beaver at work on it, a break was made one afternoon, and when the animal came after dark to investigate the cause of the falling water, a set camera and flashlight pictured it within the break. Taken in October, 1912, 45 miles west of Marquette (see page 197).

trees, everything stands out for a moment in the white glare of noonday. A dull report, and then a veil of inky darkness descends.

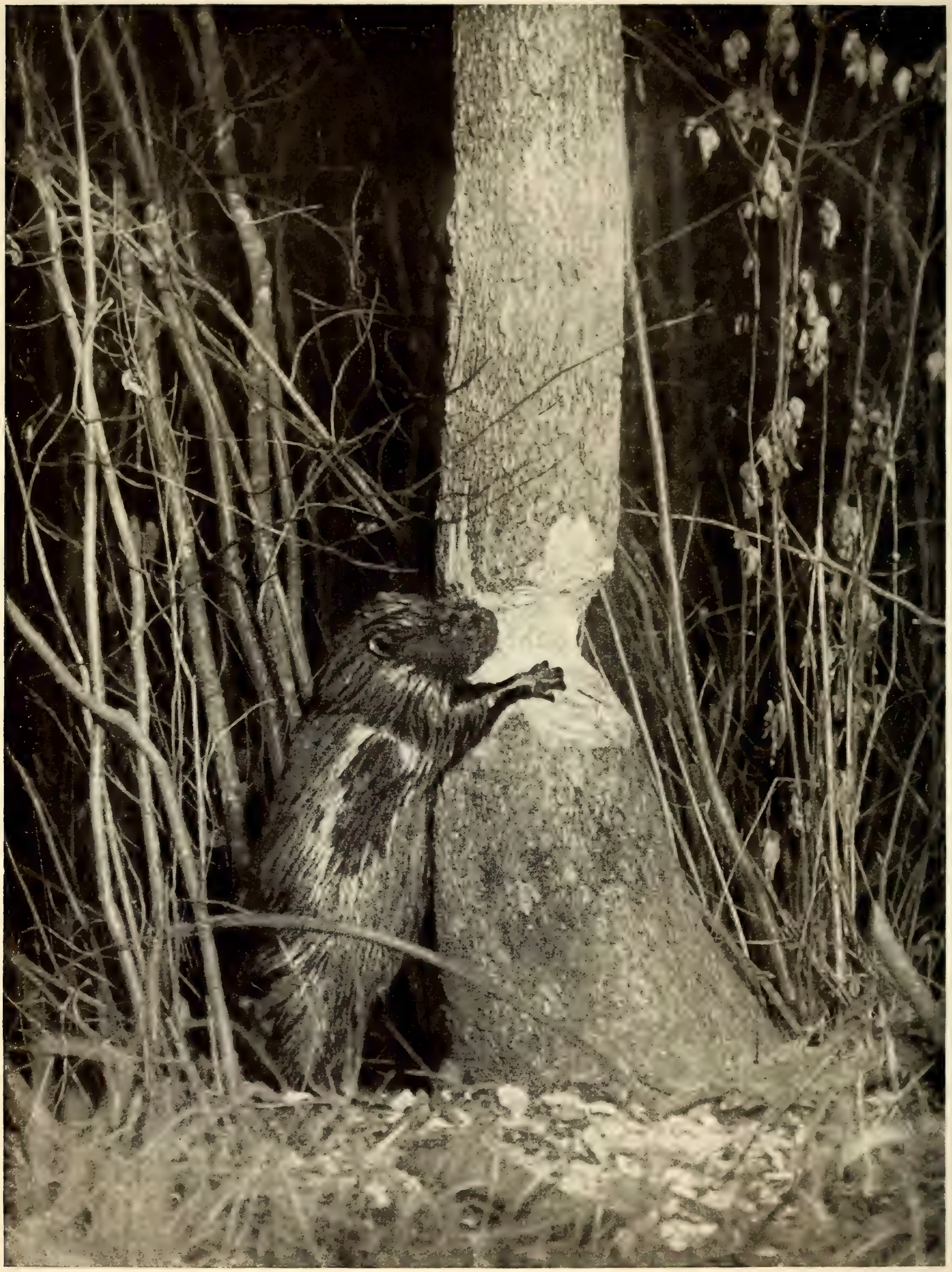
"Just a twenty-fifth of a second has elapsed, but it has been long enough to trace the picture of the deer on the plates of the cameras, and long enough to blind for the moment the eyes of both deer and men. Some place out in the darkness the deer makes a mighty leap. He has sprung toward the boat and a wave of water splashes over its occupants. Again he springs, this time toward the bank. He is beginning to see a little now, and soon he is heard running, as only a frightened deer can, away from the light that looked so beautiful, but was in fact so terrifying.

"What an account he will have for his brothers and sisters of the forest of a thing which he himself would not have believed if he had not seen it with his own eyes. In the boat, as it slips away from the bank, plates are being changed and the cameras prepared again for another mimic battle."

MAJORITY OF WILD ANIMALS ARE NOCTURNAL

In the course of time it became plain to the writer that the easiest and most satisfactory method of picturing wild game was through the use of the flashlight, for by far the greater number of wild animals are nocturnal, and when occasionally seen in the daytime can rarely be approached sufficiently near with a camera or when the light is favorable.

However, it was many years before any one else could be induced to make the effort, for it seemed hard to find one who was both a naturalist and a photographer,



Photograph by George Shiras, 3d

BEAVER CUTTING DOWN A BLACK ASH AT NIGHT: THE FIRST PICTURE OF ITS KIND

For two weeks the camera and flashlight faced this partly cut tree without result. Then one night the beaver came, leaving his picture as well as the tree, for it stands today unfelled, proof that a single animal does the work (see page 197). He was too frightened by the flash to return that season.

or, being such, had any knowledge in the use of flashlight powder and the means of approaching animals at night.

Finally, many years later, Nesbit and Dugmore, of this country, became interested, followed by Schilling, of Germany, the latter two of whom obtained remarkable night pictures on their African expeditions. Then came a host of others, whose fine and ever-increasing collections indicate the success and permanency of this method of night photography, both as a sportsman's pastime and for the scientist, when desirous of presenting wild life in its natural habitat.

PHENOMENA OF FLASHLIGHT COMPOUNDS

The range of illumination, out-of-doors, of the modern flashlight powders is limited in animal photography to about fifty feet, unless a very heavy charge is used, in conjunction with a long-focus lens.

However, the direct and collateral rays of this powder have an extraordinary range.

Homesteaders living four or five miles beyond the author's camp for some years have noticed the sudden glare of light on the sky overhead, and by inquiry finally traced the origin to the flashlight pictures being taken at or near the camp.

This led to a careful and more extended test. By prearrangement, an ounce or so of flashlight powder was fired one night in the camp, surrounded by high trees, while well below the horizon at Marquette, 20 miles distant, spectators were to report the result. They noticed a bright illumination, not only above the camp site, but its extension apparently for five or six miles along the horizon, resembling heat lightning, except for its steadiness and straight lines. Subsequent trials did not vary.

Flashlight rays will penetrate clear water for a considerable distance at night, making possible subsurface pictures, so difficult of accomplishment in the daytime, and will also permit the photographing of the interior of a room through closed windows, when the camera and flashlight are at a considerable distance on the outside—an impossibility in daylight (see picture, page 191).

Moreover, when these rays come in contact, at right angles, with those of a strong searchlight, a mile away, there appears a peculiar and very noticeable fluttering at the junction, not unlike heat lightning. This too, was tried a number of times. Apparently flashlight powder possesses properties unlike any other artificial light, and warrants an investigation by a physicist, or at least an explanation from one. So far no solution has been offered of the last phenomenon.

CHAPTER VIII

GRAND ISLAND AND ITS HERD OF ALBINO DEER

Doubtless many former readers of "Robinson Crusoe," who later have had occasion to explore remote places on land or sea, retain a special interest in islands, more particularly when such places are in a primeval condition, with a variety of plant and animal life.

Physical barriers serve not only in preserving the purity of a given species, but are often the means of furthering the origin and continuance of new forms; for all organic life has its abnormalities, and some may develop a freakish manifestation into a permanent character, just as others yield gradually to environmental influences, especially where not indigenous to the region.

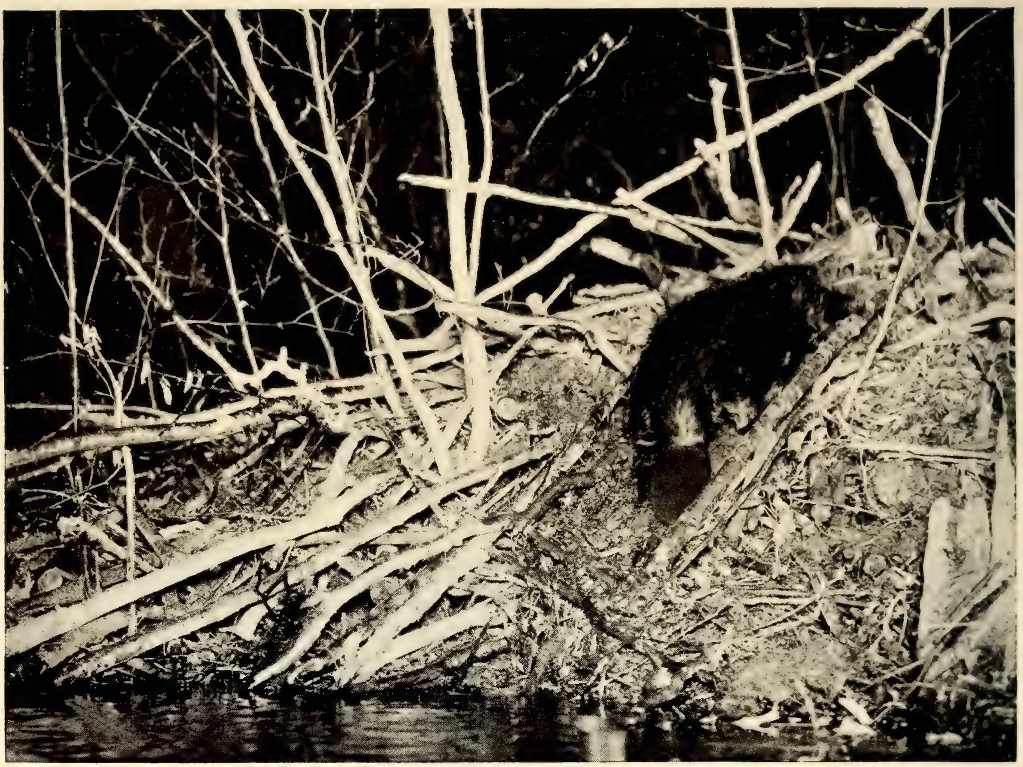
Lying athwart the entrance of one of the few deep bays on the southern shore of Lake Superior is Grand Island, true to its name in size and beauty. Terminating the westerly end of the famous Pictured Rocks, its giant sandstone cliffs on the north end face the widest portion of the lake, while the nearly land-locked waters on the inner side afford the only natural harbor for many miles (see map, page 114).

CAMPING PLACE OF OJIBWAY INDIANS FOR CENTURIES

This was the camping place of the Ojibway Indians for many centuries, and later a trading post was established, with the interesting life incident thereto.

When tourist travel began, in 1855, on the completion of the first lock at Sault Ste. Marie, this precipitous part of the coast, with its multicolored cliffs and castellated rocks, was seen at close range from the deck of passenger steamers.

Grand Island, with a shoreline of about



Photograph by George Shiras, 3d

NIGHT PICTURE OF A BEAVER PLASTERING HIS HOME WITH MUD

In the fall these animals renewed the covering of mud on their house, not only for comfort, but as a protection against marauding animals, which cannot tear the structure apart when cemented with frozen mud. The picture shows the home of the beaver colony living on the river half-way between the author's camp and Whitefish Lake (see page 197).

40 miles, heavily forested, containing lakes, ponds, and overflowing streams, was always the resort of wild game, the deer in particular being attracted by several natural salt licks near the center of the island.

When a youth, I camped each season with older members of my family on the opposite shores, where so abundant were the trout, deer, wild pigeons, and grouse that only on rare occasions was the island visited.

THE ISLAND CONVERTED INTO A GAME PRESERVE

Whenever I ventured into the dark, tangled forests, it seemed that the deer had inherited a greater degree of sagacity than those roaming in comparative safety throughout the unbroken wilderness ashore, due, doubtless, to the peril of island segregation and the inherited fear of the Indian and the fur trader, who made this locality a general rendezvous and hunting ground.

Providentially, in modern times this beautiful island has been saved from the ravages of the axe and the too deadly use of the gun, for a number of years ago it was acquired by a mining and lumber company in the purchase of a larger tract ashore.

Unlike many of the pioneer corporations of the West, this company has always shown a commendable interest in the welfare of the various communities in which it has operated, leaving more than a fair equivalent for that which must be destroyed. It was this spirit which led to an extensive effort to protect the native wild game and to introduce new or foreign species most likely to succeed in a northern country.

Starting with a hundred or more native deer, moose were introduced, together with elk, caribou, black-tail deer,

Photograph by George Shiras, 3d

THE LODGE OF THE RIVER COLONY OF BEAVERS

Showing a great collection of brush and small logs stored in the pool before the house for their winter supply of food (see page 181).

antelope, and several hundred pairs of Scandinavian game birds. For the use of the last-named, thousands of young Scotch firs were successfully planted, to provide their natural winter food. The results of this experiment are interesting and of value for the future.

The Scandinavian birds, principally capercailzie, raised a brood or two, and then fell victims to birds of prey and ground vermin, showing their inadaptability in a country otherwise suitable. Their foes were too numerous and were different from those across the sea.

A HERD OF CARIBOU PLUNGES TO DEATH

The first herd of Newfoundland caribou on a stormy winter night went headlong to their death when pursued by a stray timber-wolf. They leaped from one of the higher wooded cliffs into Lake Superior, under the sheep-like influence that causes these animals to follow a leader and to regard the distance traveled rather than cunning evasion the best means of eluding a pursuing foe. The entire herd perished (see page 144).

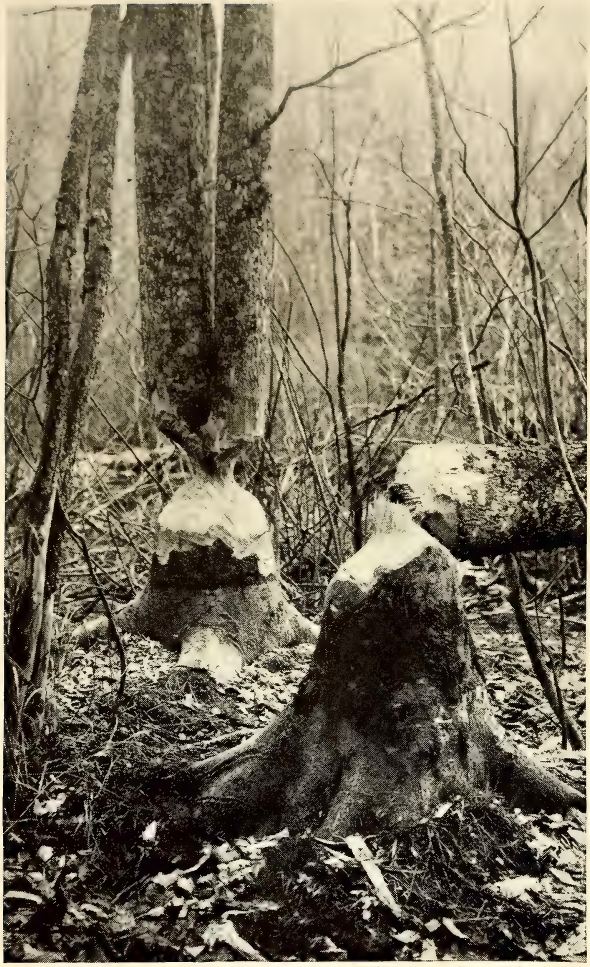
The next importation of caribou developed both species of bot-fly that have always proved such a dreadful and unsightly affliction on their native island; but, unable to suffer and recover, as in their original habitat, these animals also came to a pitiful end.

Again, a wolf crossed on the ice and, getting beneath the game fence confining the animals to the higher ground, soon put an end to the black-tail deer, for they lacked the elusiveness of the white-tail; while the antelope, as rather expected, found the few clearings too small for their roaming habits, and in the deep snows characterizing the upper lake region they gave up the struggle for existence.

THE MOROSE MOOSE VANISHED, TOO

The moose at first thrived and bid fair to succeed in a country adapted to their ways, but on the tremendous increase in the white-tail deer and elk, they refused to travel the runways of their uncongenial rivals. They secreted themselves in a swamp bordering a small lake, where lack of range and food brought on disease, and then these morose and stolid animals vanished, the usual result with moose when too confined—a fact which accounts for the rarity with which they are found in zoölogical parks.

The native white-tail, therefore, won the day against all enforced intruders except the elk. Consequently in these two species we have the ones best adapted for



Photograph by George Shiras, 3d

A TYPICAL SCENE ON WHITEFISH RIVER

From 25 to 30 ash are in different stages of felling or dismemberment, showing that these beavers do not finish one tree before beginning on another. Average time in felling a tree, ten days (see page 197).

the unoccupied ranges throughout the more easterly part of the country.

A closed hunting season on any island, however big, will finally bring most animals face to face with an unavoidable enemy—starvation. Thus it became necessary to supply some food in winter, besides shipping hundreds of deer and surplus elk to parks and game preserves, followed still later by an open season on deer.

THE BEGINNING OF THE ALBINO DEER COLONY

If, however, this long and costly effort to make Grand Island the permanent home of many immigrant species has proved disappointing, an unexpected reward has come, which may eventually prove of greater value than the fulfillment of the original plan, namely, the establishment of a beautiful herd of albino white-tail deer.

A characteristic of the Michigan deer has been the general uniformity in physical appearance; for, though more deer have been killed in Michigan during the past fifty years than the aggregate elsewhere, there are very few freaks in antlers or extremes in weight, while albinism has been equally rare.

Some ten years ago word came that a fine albino buck had been seen frequently on Grand Island coming to a little pond on the easterly side. Taking a camping outfit, a canoe, and my guide, several days and nights were spent watching the pond, and although other deer came during the day or were seen under the jack-light, the white buck did not appear.

The next year the quest was no more successful, and when I heard that on the opening of the season the white buck had been killed, it was a consolation to know that the body was in the hands of a taxidermist, preparatory to being added to the little museum of the island hotel.

There, later, I took the measurements of the antlers and body, and then, to show what a striking picture such a marbled figure would present with a background of black, the mounted animal was carried one evening to the edge of the forest where once it had roamed and the flashlight fired (see page 148).

Feeling quite confident, from the age of this buck, that white descendants would sometimes be found, a careful watch was maintained throughout the island.

Finally, in the fall of 1915, a good-sized albino buck was noticed loitering about the box traps set for capturing deer to be shipped away. With little effort it was taken.

Upon the removal to temporary quar-

Photograph by George Shiras, 3d

FELLING A TREE UNDER DIFFICULTIES

A beaver cuts through the average tree in a space between 18 and 25 inches above the ground. After cutting on the opposite side this beaver had to finish the job while seated on a log. Note its resemblance to a large muskrat (see page 194).

ters it was found that the buck was suffering from an injury to the spine and was unable to stand.

Recognizing the rarity of such a capture, a regular attendant was placed in charge, and daily it was fed and watered in a reclining position. After a month it recovered sufficiently to walk about, and by spring was in good condition.

DEER WOULD NOT ALLOW KEEPER TO CHANGE HIS COAT

Then an odd thing happened. The faithful caretaker, on approaching the stall one morning, was surprised at the buck showing the greatest terror, plunging about in a way to threaten new injuries. Retiring at once, the question arose as to the cause. Remembering that for the first time he had not worn his winter fur coat, it was replaced, and the buck became docile at once, showing how animals, usually dependent upon scent, may associate an outward garment with identity. Possibly this old fur coat had an odor of its own!

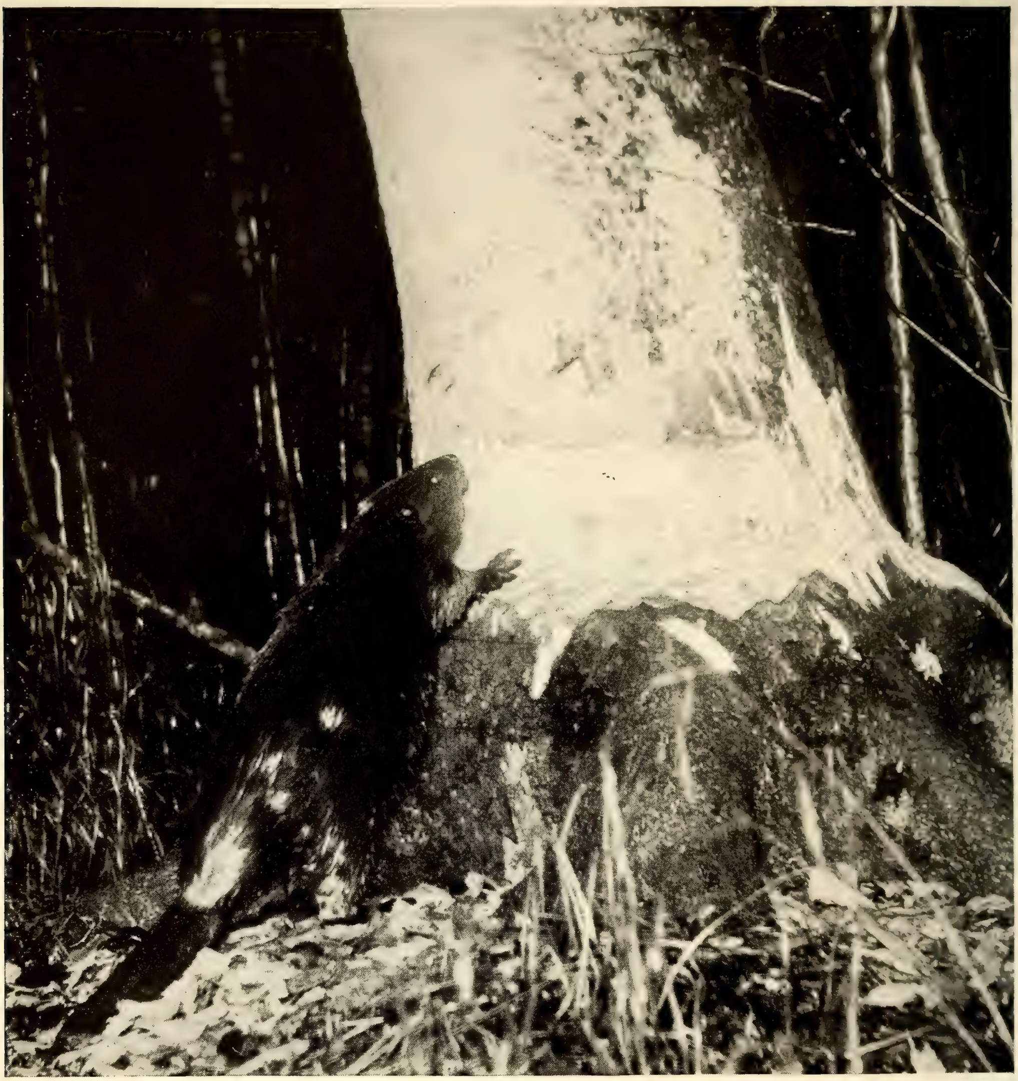
Then the idea of establishing a herd of white deer suggested itself, and with this in view four red does were captured and placed in a good-sized range with the white buck.

A WHITE FAWN FOUND

A few weeks later the project was favored by finding a female white fawn, a day or two old, in a thicket near the island hotel. With careful attention and in the company of another fawn, it grew rapidly.

During the earlier months this fawn had the usual row of white spots on the back and sides, and although there was no difference between these and the body color, they were conspicuous in the same way that satin needlework in a single color may carry a varied pattern (see page 147).

The following year one of the red does in the inclosure bore an albino doe fawn, which lacked, however, the brocaded white spots characterizing the previous one.



Photograph by George Shiras, 3d

CUTTING DOWN A GREAT BLACK ASH: WHITEFISH RIVER

The principal winter food of the beaver on the lake and river is obtained from the hundreds of black ash growing only a few inches above the water level and reached by side channels or sometimes artificial canals. After the smaller ones were cut came others of considerable size. The tree in the picture is 91 inches in circumference, and for three years different beavers have attempted to cut it down, but the flashlight has discouraged the completion of these efforts. The animals store the branches of the tree and eat the bark.

By this time the first fawn had become a yearling and was placed in the same inclosure. Three years ago I learned that there was a yearling albino doe at the State Game Farm, and in a few weeks it was safely transported to Grand Island, where such an addition in new blood has proved of undoubted value.

Then came a telegram in 1919 that the white buck had died suddenly in November, leaving only a buck fawn as the future head of the herd.

In the following spring, however, a posthumous white fawn was born, followed by the favorable news that a large albino doe and two white fawns had been seen on several occasions in a remote part of the island, and these latter can be placed in the inclosure if deemed advisable.

It may be of interest to note that the original buck weighed about 150 pounds and possessed a rather extraordinary set of antlers, spreading 26 inches, with the terminal points much farther apart than any other I have ever seen.

VELVET ON ANTLERS WAS SNOW-WHITE

The velvet on the antlers of both bucks was snow-white, giving them a most statuesque appearance amid the green foliage of the forest.

The eyes of the native albinos are a very light gray-blue, while the doe from the southern portion of the State has the usual red eyeballs. The lack of any pigment in the layers of the retina of this latter individual discloses the red blood-vessels characterizing most albinos, making it very susceptible to a bright light.

The second buck differed from the original one in being somewhat larger, but had only two long spikes of about eighteen inches, the left one slightly forked each season.

The albino deer shed their white summer coat at the usual time, and it is replaced by a heavier and thicker covering, though not quite so long as the winter gray coat of the normal deer. The skin is a light pink, showing plainly through the thin summer coat, in contrast with the almost black epidermis of the other deer. The hoofs and skin of the nostrils are a pearl-gray, instead of black, while the velvet on the growing antlers is white, but when freed from this covering the antlers have the usual brownish-yellow coloring, the only exterior part of the white deer resembling the normal ones.

THE FIRST ATTEMPT TO PERPETUATE ALBINO DEER

Up to the present time, the effort to perpetuate an albinistic strain has been largely confined to white mice and rats, white rabbits, and poultry, for in the larger animals this occasional recession from normal only results in the killing of such conspicuous objects, man and predatory animals being alike responsible. Moreover, when occasionally captured, it rarely happens a mate can be found of similar color.

This white phase is found in all organic life, as, for instance, elk, deer, porcupine (see page 121), beaver, muskrats, squirrels, many wild-fowl, robins, swallows, crows, blackbirds, woodcock, and in frogs, fish, insects, and several forms of plant life, due to the absence of pigment. This deficiency in coloring affects only the outer skin, the hair, or feathers, as well as the retina of the eyes and the hoofs of most quadrupeds. Partial albinism is frequent, and in New Brunswick I saw a number of deer splotched with white of various patterns, giving some of them a strikingly odd appearance.

The writer has been under the impression that the first offspring of albinos were usually white, and on and after the third generation uniformly so, following the rule in silver and black foxes. Several biologists, however, have contended that "albinism being a purely recessive character among mammals, albinos should breed true from the first." That this conclusion is sometimes a mistake was shown a year ago, when one of the white does bore a normally colored fawn, the white buck being the only male in the inclosure.

There are many nature lovers, vitally interested in the efforts of science to produce and perpetuate new variants of existing species, who will be gratified to know that as time goes on specimens of this new and beautiful phase of the white-tail may find representation in other parts of the country. The various members of this original albino colony are shown herein at different ages, in varied attitudes, and in contrasting seasons.

CHAPTER IX

MOOSE ON ST. IGNACE ISLAND

Diagonally opposite Marquette and on the north shore is an interesting and beautiful group of islands, the largest of which, St. Ignace, occupies the entrance to Nipigon Bay, into which flows the most famous of Canadian trout streams.

On a trip west of Port Arthur, in 1916, for the purpose of studying the moose along the international waters between Minnesota and Ontario, I was told that several of the larger islands near the Nipigon contained an incredible number of moose, but as at this point the line of the Canadian Pacific follows the shore, in sight of the islands, the report seemed somewhat doubtful. However, in the

Photograph by George Shiras, 3d

FLASHLIGHT OF A BEAVER TOWING A SAPLING, WHICH IS TO BE ADDED TO ITS STORE OF FOOD FOR WINTER

Unlike the muskrat, with its body well out of the water (see page 199), the beaver swims nearly submerged, with only the head showing (at the right). At a distance it is sometimes hard to tell one from the other when swimming, except by the greater speed and wake of the beaver.

following year it was decided to investigate, for except on Isle Royal, the largest island in the lake, the moose had not been authoritatively reported as island occupants.

It should be stated that for some years after the writer came to Lake Superior moose and white-tail deer were unknown on the north shore, although caribou were abundant, especially in the fall and winter.

MOOSE MIGRATED FROM QUEBEC

About 1885 a steady movement of the moose westerly from Quebec was observed and a slower easterly migration from northern Minnesota. Eventually these animals commingled and took possession of the entire shore, later extending into the interior until they reached the waters flowing into Hudson Bay.

Following the moose came the white-tail deer and many timber-wolves, when the caribou began yielding the possession of centuries.

After the construction of the railroad, extensive lumbering and many forest fires changed the face of the country, large clearings and a mixed vegetation succeeding dense evergreen forests, and to this change may be principally attributed the influx of new animals and birds.

Most of this land being unsuitable for settlement insures a permanent and widely extended range for many of the big-game animals suffering eviction in districts valuable for mining or agriculture.

In September, 1917, our party arrived at Rossport, a little fishing village between the railroad and a bay opposite Simpsons Island, next in size to St. Ignace. Here provisions and canoes were obtained, and a few hours later the little tug was on its way, the party alert to detect the first island moose, the pilot having given assurance that before reaching the camp site several would be seen.

MOOSE FOUND FEEDING IN THE LAKE

When passing through the broad channel separating the two larger islands, three moose were noted well out in the shallow water at the end of a long bay, the first time in my experience that any such game animal was found feeding in the waters of Lake Superior, which, by reason of its depth and temperature, contains little aquatic vegetation.

Along the winding shores was noted a great variety of second-growth trees particularly suitable as browsing material for the moose, such as poplar, cherry,

Photograph by George Shiras, 3d

PARENT AND YOUNG BEAVER EATING THE BARK OF A POPLAR LOG USED BY THE AUTHOR AS BAIT

Only once did more than one beaver appear on the negative. Here a small poplar log attracted the mother beaver and her youthful offspring.

birch, soft maple, mountain ash, and balsam, while interspersed the dense forests of spruce offered a safe retreat from the hunter and an excellent shelter in the winter, being the only tree never eaten by moose or deer in this region.

WATCHING FOR MOOSE AT THE SALT LICKS

However, the apparent abundance of arboreal food was misleading, for it was now seen from the boat that all the lower limbs of the trees referred to had been eaten or destroyed by the animals for some ten feet above the ground, accounting for the moose just seen in a shallow bay, where the temperature permitted an unusual growth of water plants (see page 163).

Unlike Grand Island, with its precipitous cliffs to the north, most of the exposed shore of St. Ignace Island was low, with many bays separated by narrow, rocky points offering suitable camping places, where reefs and shallow waters seemed favorable for the best of trout fishing, while inland were high, rounded hills approaching an altitude of fifteen hundred feet, besides several rocky ridges dividing the island into many basins filled with the purest water, ranging from ponds of an acre to a lake four miles long, totaling nearly fifty on an island eight miles by five in size.

The tents were pitched on a level bank in a well-sheltered grove, at the edge of which flowed a fine trout stream leading from the largest of the interior lakes (see page 157).

Although facing the widest portion of Lake Superior, it was our intention to spend most of the time looking for moose in near-by ponds, as well as watching for them at several natural salt licks in a deep valley behind the camp.

BIG MOOSE HERD LIVING ON WATER PLANTS

These licks were discovered by two members of the party fifteen years before, when a yacht in which they were cruising ran on a reef. While awaiting the assistance of a tug the island was visited, where numerous caribou tracks about muddy pools indicated the presence of salt springs. It was due to this rather ancient record that we expected to find the moose as successors to the caribou at these resorts, which calculation proved correct. What the camera captured is best told by some of the illustrations accompanying this article.

In a week one hundred and fifty moose were seen, all apparently depending upon water plants for support, the numerous ponds and lakes yielding a sufficiency, though often the animals were forced to feed in water well over their backs, as they dived out of sight in search of food (see page 162).

Only on the face of inaccessible cliffs was the vegetation undisturbed, and just how these animals survived the long winter, when the waters were closed, was a problem, though many of them may have crossed to the main shore and returned in the spring. In a patch of spruce were discovered two large pairs of interlocked moose antlers, where these animals, in the fierce rivalry of the mating season, had gone down in mutual defeat forever (see page 161).

At the time of our visit no one was living on any of these islands, but nearby inhabitants supplied themselves with moose meat regardless of the law, justifying it on account of war conditions. At a salt spring several hundred yards back of the camp I located the first blind, where it was disturbing to see a four-year-old bull moose lying dead within thirty yards, killed but a few hours before and abandoned by reason of our proximity. Here, festering in the sun, it soon drove away any of its surviving associates (see page 159).

MOOSE DIG A BASIN OF CLAY AT SALT SPRING

Several days later another blind was placed opposite one of the best natural licks I have ever seen, located a mile up the stream from the first. Here the moose during many years had dug out a large clay basin, into which trickled a salt spring from the adjoining bank, the mixture resembling liquid mortar.

Every time we passed the place one or two moose would leave hurriedly, but a trial in the daytime showed that the scent circled toward the lick, covering every approaching runway; so a flashlight and camera were set up, and on the night following a large cow moose took its own picture at a distance of fifteen feet. The analysis of this salt lick is given in the text beneath the picture (see page 164).

On several islands adjoining, the moose were numerous and tracks proved the presence of a considerable number of caribou. All these animals visited licks similar to those on St. Ignace. On the opening of the hunting season, the same fall, one party of five from Port Arthur killed their limit of five big bull moose on the first day of the hunt, the antlers ranging in spread from forty-eight to fifty-four inches. The question uppermost in the author's mind is whether any of the fine bulls pictured in this chapter furnished some of these trophies.

Just as the south shore has been almost depleted of its trout by taking them at the mouths of all the spawning streams during their fall migration, similar conditions now prevail on the north shore, while a worse habit of running the gill-nets to the beach, ostensibly set for lake trout and whitefish, results in taking all the speckled trout exceeding two pounds in weight, and soon only the Nipigon, always under rigid government supervision, will remain.

CHAPTER X

WILD LIFE IN AND ABOUT THE CAMP GARDEN, WHITEFISH LAKE

In a previous issue of this Magazine* reference was made to the large number of birds and animals visiting the clearing and log cabins of a wilderness camp; for such a place is often an oasis in a dense and monotonous forest, where sunshine, wild berries and seeds, shrubbery and ground vegetation, insects, and small rodents offer food or a trysting place to many a creature outlawed by man.

Mention, too, was made of smaller and less timid animals which came at night to the gardens and poultry yards of many a rural home, especially when there are thickets, swamps, or rocky ravines in the vicinity. The tenacity with which these refuges are occupied by certain wild animals in the midst of encroaching civilization is an interesting study in resourcefulness and adaptability, wherein reason plays a part quite as important as that of instinct.

For nearly thirty years my camp was occupied only in the fishing and hunting season, followed by intermittent or long

* See "Wild Animals That Took Their Pictures by Day and by Night," July, 1913.

periods of disuse. On returning, there was varied evidence of of many woodland visitors, for here, in a sunny spot, would be the daily dusting place of the grouse; everywhere were the hoofprints of deer and occasionally the dog-like tracks of a skulking wolf, unafraid of a hunter's cabin when a fresh trail of a deer gave assurance of a long-absent owner.

There were doorsills and pork barrels gnawed by the saline-seeking porcupine; the broken branches of a mountain ash where Bruin leisurely pulled down red clusters of frost-sweetened berries; the tender saplings girdled by a varying hare; clover and dandelions cropped close by bulky woodchucks; the pungent odor of a skunk beneath the cabin floor, and tracks of the great blue heron, mink, muskrat, and the beaver on the sand-bars of the creek flowing through the camp lot.

Photograph from George Shiras, 3d

A BEAVER EYEING THE OUTFIT WITH SUSPICION

Sometimes the thread, as above, runs to the base of the tree, showing the beaver making a preliminary circle before starting to work; in other cases the thread is attached just below the cutting, picturing the animal erect (see page 178).

STUDIES IN ANIMAL PSYCHOLOGY

Perhaps the first night there would be a chorus of indignant owls within the glare of the camp-fire or the startled snort of an approaching deer. Then all would change. For the circling smoke, the heavy blows of the axe upon the hardwood logs, human voices, and the telltale scent gave distant warning of the enemy's return.

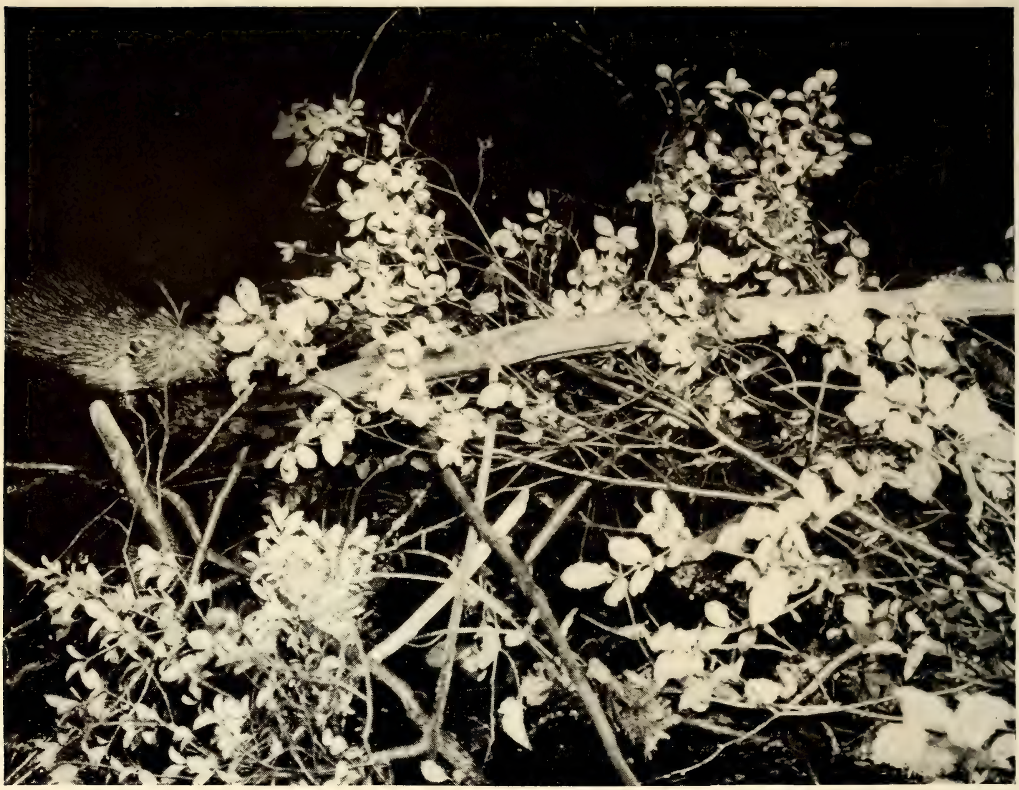
Except for the twittering of the chipmunk, the tattoo of the woodpeckers, and the flight of cedar birds and bluejays across the clearing, or the scamperings of the white-footed mice upon the cabin floor, all the more timid birds and animals would disappear.

The difference between the time when there was neither a habitation nor a railroad within twenty miles (see page 124) and when a more accessible camp was enlarged and a caretaker continuously in charge affords one of the most interesting chapters in animal psychology within the writer's experience.

It might well be supposed the eviction of forest visitors was final when the place was occupied by day and night, with all the noise and bustle of a woodland home, for the chorus of barnyard fowls, the neighing of horses, the lowing and the tinkling bells of browsing cattle, the chug of an engine filling the garden tank, the circling smoke, and the glittering lights seen afar each night gave ample notice to every living thing that man had invaded their domain and intended to abide therein throughout the year.

THE CAMP BECOMES A RENDEZVOUS FOR FOREST FOLK

But just the contrary happened. The deer soon found that their ancient enemy preferred a camera to the gun, and, freed from the terror of prowling wolves, took



Photograph by George Shiras, 3d

A BEAVER (AT LEFT) FILLING IN THE SLUICEWAY OF THE OLD LOGGING DAM (SEE PAGE 198)

After the sluiceway had been two-thirds filled with water-soaked logs and sticks, it was completed by intertwining bushes and water-grasses, with a stone or log to hold them down.

possession of swamps and near-by thickets. The grouse knew the fox and lynx were equally cautious, and nested contentedly at the edge of the clearing.

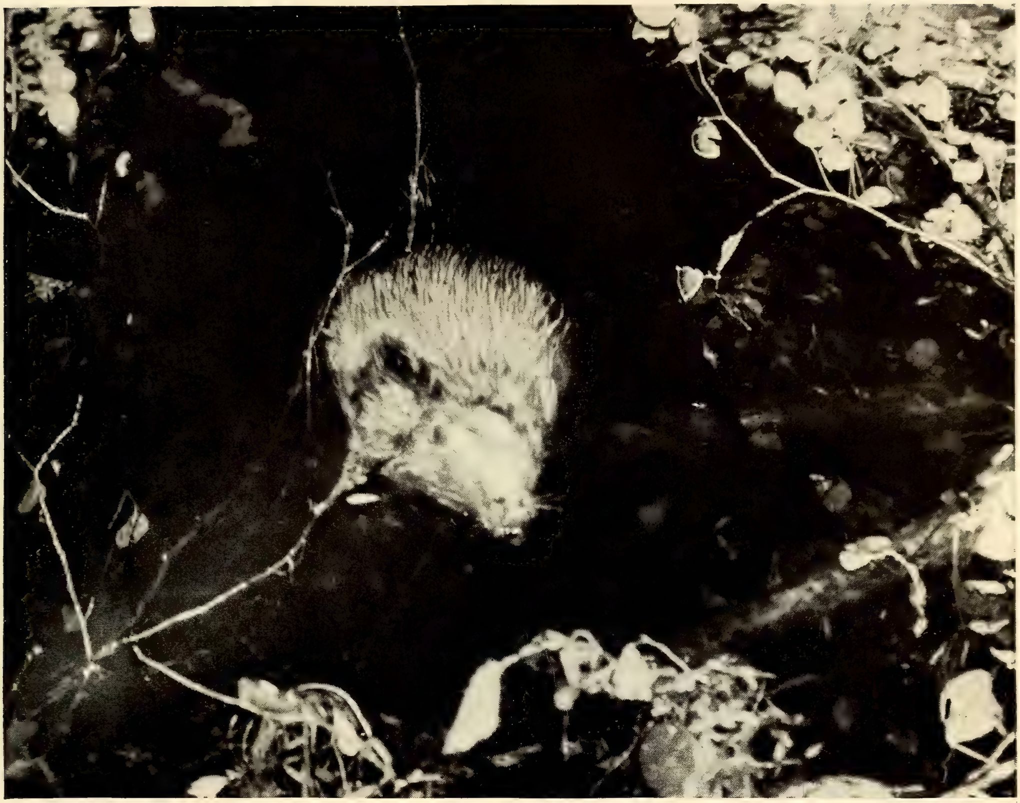
Robins, safe from hawks and owls, built numerous nests in the scattered balsam, finding angleworms and berries for their clamorous broods. The night-loving hare nibbled on the clover beneath the midday sun (see page 168); the muskrats had trails straight from the creek to the nearest carrot patch; porcupines chiseled the tender bark of many a sapling; once a beaver gnawed a half-grown ash by the boat-house and only retreated when the flashlight recorded a midnight visit (see page 167).

Raccoons knew when the corn was tender, and again the flashlight saved the crop; skunks dug holes beneath the stable floor and now and then picked up a belated fowl; a mink, grown tired of a diet of fish, took heavy toll of the snow-white ducks in the swimming-pool (see page 166); chipmunks found the little potatoes just the things for carrying off; cherry birds gladly changed from the wild to domestic fruit (see page 123), and all day long woodpeckers, nuthatches, catbirds, and jays picked at the suet hung conveniently near.

Humming-birds and butterflies flitted among the flowers, beneath which sat little green frogs sure of a meal (see page 174); the blue heron stalked at the edge of the stream (see page 169), and none ever had reason to regret a camp wedged in the mighty forest, except those seeking the lives of harmless creatures.

THE DEER AS MIDNIGHT VISITORS

The most interesting as well as the most destructive visitors were the deer, for as the gradually enlarging garden



Photograph by George Shiras, 3d

BEAVER WORKING ON SUBSTRUCTURE OF THE DAM THREE FEET BELOW THE SURFACE

This scene represents one of the many beavers that, for the past six years, have endeavored to fill in the sluiceway of the lumber dam above the author's Whitefish Lake camp (see page 198). This beaver fired the flashlight when he was several feet below the surface. Body takes white, oil on hair reflecting light. Note the hair separated in strands by the current.

offered a greater variety of vegetables and small fruits, the temptation proved irresistible.

When the garden patch was a simple one, and unguarded before the hunting season, the bucks were formerly active in these forays; but few came later, the gallantry of the mating season sometimes inducing an antlered escort to jump the fence over which had already gone his less timorous partner.

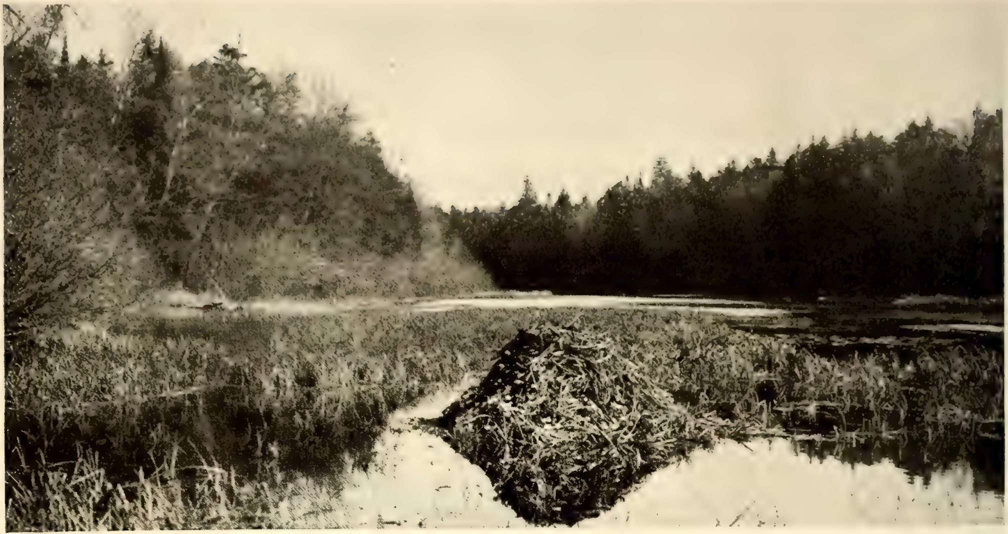
Does, fawns, and yearlings, totaling some seasons more than a dozen, each night or so registered their presence and respective ages by the clear-cut hoofprints in the garden soil. Rarely did one come before midnight and seldom were any seen in the vicinity during the day.

In the past decade a record has been kept of the vegetables and fruits most preferred, with a notation when there was a marked departure any season by groups or individuals.

RASPBERRY BUSHES FIRST VISITED BY DEER

Not until the fawns were free to follow their mothers and the garden offered the first of the ripening crops would there be a visitor. On or about the middle of July the wild raspberry bushes close by the fence showed a clipping of the newer growth, followed by a nibbling on the tender bark of border fruit trees. A few days later, when the darkened windows gave assurance that the occupants had retired, the vegetable patches close by the cabins were visited.

In the order of choice, and somewhat determined by the rate of growth, came the carrot and beet tops, lettuce, and new shoots of domestic raspberries, white clover, peas, Brussels sprouts, and white



Photograph by George Shiras, 3d

A CONVENTIONAL HOME OF THE MUSKRAT

A type of house built by all muskrats in shallow, marshy waters throughout the country. This presents a view of the slough much frequented by deer (see page 127).

and red cabbage, the last mentioned, by reason of its sweetness, preferred above all else.

None ever touched the leaves or products of the potato plant, tomatoes, squash, rhubarb, corn, cucumbers, asparagus, onions, or parsnips, and the escape of the latter was inexplicable. Some seasons their attention was almost entirely devoted to the strawberry plants, and then the next year not a leaf or a tender runner would be touched.

FLASHLIGHT TEMPORARILY DETERS ANTLERED MARAUDERS

In the endeavor to save the cabbages, they were always planted within a few feet of the caretaker's bedroom; but often in the morning a great gaping hole in the center of a head showed what was considered the choicest morsel and willingness to take a chance.

Partly to save the crops and, in my own case, more to record the presence of the most cunning of our antlered animals, the flashlight and cameras were put in different parts of the garden, with a cabin or some camp shelter as a background when possible. More than fifty such pictures have been taken, a few of which accompany this article (see pp. 170-173). The heavy report and dazzling glare terrified each marauder for a week or two, and then, led by hungry and less timid fawns, they returned again to the feast, where on moonlight nights their shadowy forms might be seen moving noiselessly from place to place.

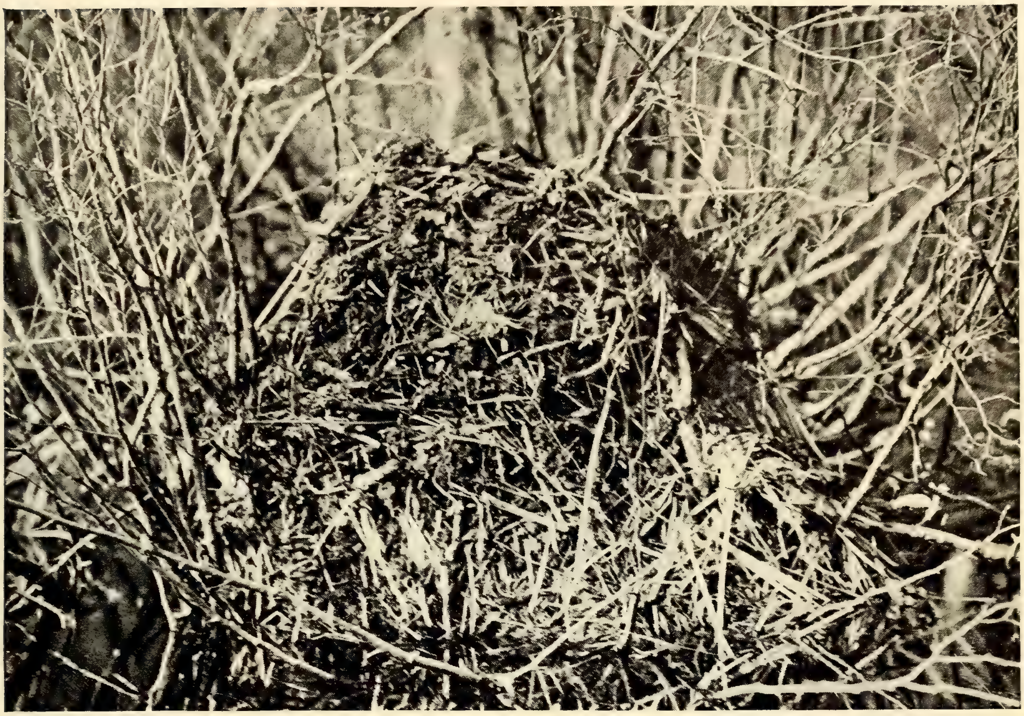
MUSKRATS MAKE A FORAY ON PARSNIPS

As another means of saving a portion of the crops intended for winter use, each on reaching maturity was placed in the root-house, except on one occasion the parsnips, which, never having been molested, were left in the ground, well covered with four or five feet of snow. It was the intention to dig them out early in the spring, when they would be in a better and sweeter condition than if placed in the root-house.

In the spring, as the deep snow began melting, a hole was dug down to the soil for a first meal on the parsnips, when a tunnel, with branches leading 200 feet to the water, made by muskrats, was found and not a vegetable remained! This showed very plainly the habits of these animals in venturing far from the water-courses and beneath the deep snows in search of green food untouched by frosts or zero weather.

SUMMER RESIDENT BIRDS ABOUT CAMP

In addition to the birds already mentioned within the camp inclosure and the



Photograph by George Shiras, 3d

IMITATING THE BEAVER HOUSE

A large muskrat house constructed entirely of sticks and mud, closely resembling in shape and material that of the beaver; south end of Whitefish Lake.

vicinity, a large number have been omitted which may now be noted in order to complete the record. No migrant passing to the north or returning in the fall is included, but only those found nesting or in company with young too immature to have crossed Lake Superior. Among the birds are the following:

The hooded merganser, mallard, black-duck, wood-duck, bittern, great blue heron, solitary sandpiper, spotted sandpiper, and killdeer; the hawks include Cooper's, the red-tailed, broad-winged, and the sparrow-hawk, and the owls are the barred and the western horned, both winter residents. Among the other birds are the black-billed cuckoo, belted kingfisher, hairy and downy woodpeckers, yellow-bellied sapsucker, northern pileated woodpecker, flicker, nighthawk, chimney swift, ruby-throated humming-bird, kingbird, phœbe, olive-sided flycatcher, wood pewee, alder flycatcher, least flycatcher, cowbird, meadow lark, bronzed grackle, purple finch, goldfinch; and the sparrows are the vesper, white-throated, chipping, field, song, and the Lincoln sparrow (doubtful), together with the slate-colored junco, the rose-breasted grosbeak, barn swallow, tree swallow, cedar waxwing (see page 123); and the warblers are the black and white, black-throated blue, myrtle, chestnut-sided, Blackburnian, and black-throated green warbler, the list concluding with the oven-bird, Grinnell's water thrush, house wren, white-breasted nuthatch, chickadee, olive-backed thrush, and bluebird.*

CHAPTER XI

THE BEAVER AND THE MUSKRAT: A COMPARISON

Conspicuous among the few North American animals which have no representative in the Old World is the muskrat, its fossil remains being found in Pleistocene deposits in many parts of the United States, while the beaver belongs to a more remote time, its ancestors going back to the Tertiary period, when they were associated with the mastodons and mammoths throughout portions of Europe and Asia.

Considering the early importance of the beaver as a source of fur and food, and the respect shown its skill in constructing dams and houses, in cutting

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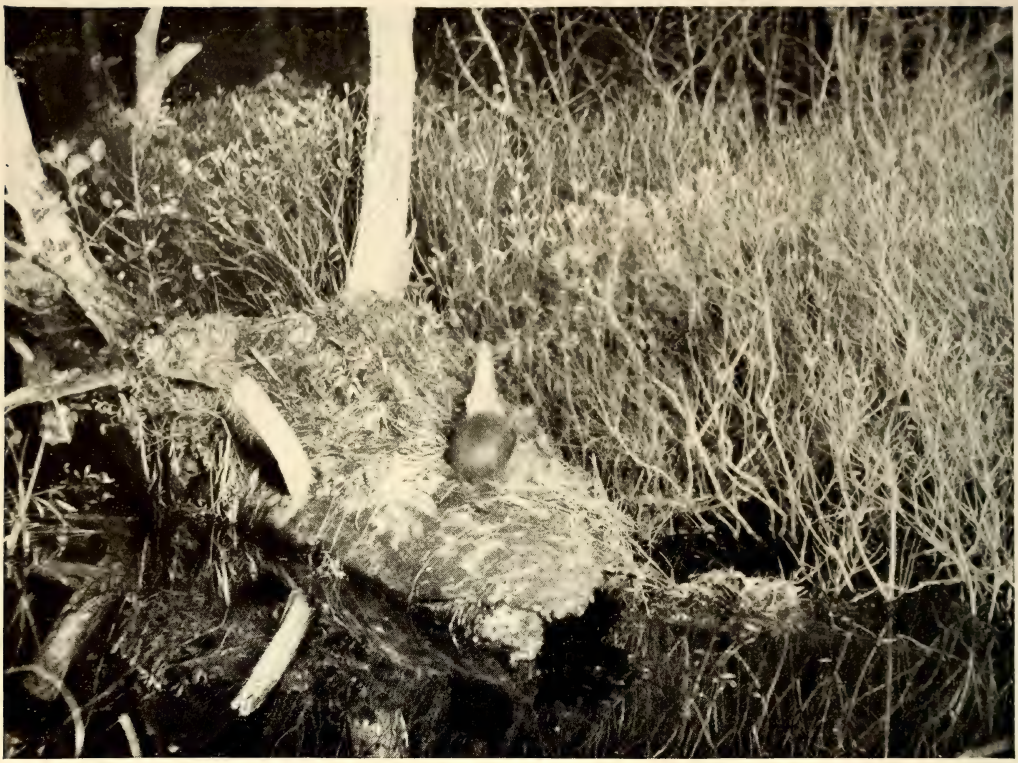
* This list was verified by Mr. Norman Wood, field naturalist of the Michigan University Museum, who spent the spring and summer of 1918 at the author's camp.



Photograph by George Shiras, 3d

MUSKRAT HOUSE WITH A CORRIDOR

For five years, at least, a pair of muskrats have used this hollow log as an entrance to their winter home, which is rebuilt each fall on top of the log. A hole in the upper part provides an entrance (see also illustration on opposite page).

and storing its winter food, or wariness in avoiding the multitude of methods designed for its undoing, it is not strange that this animal figured in the tribal ceremonies of various Indian tribes and was exalted above other animals.

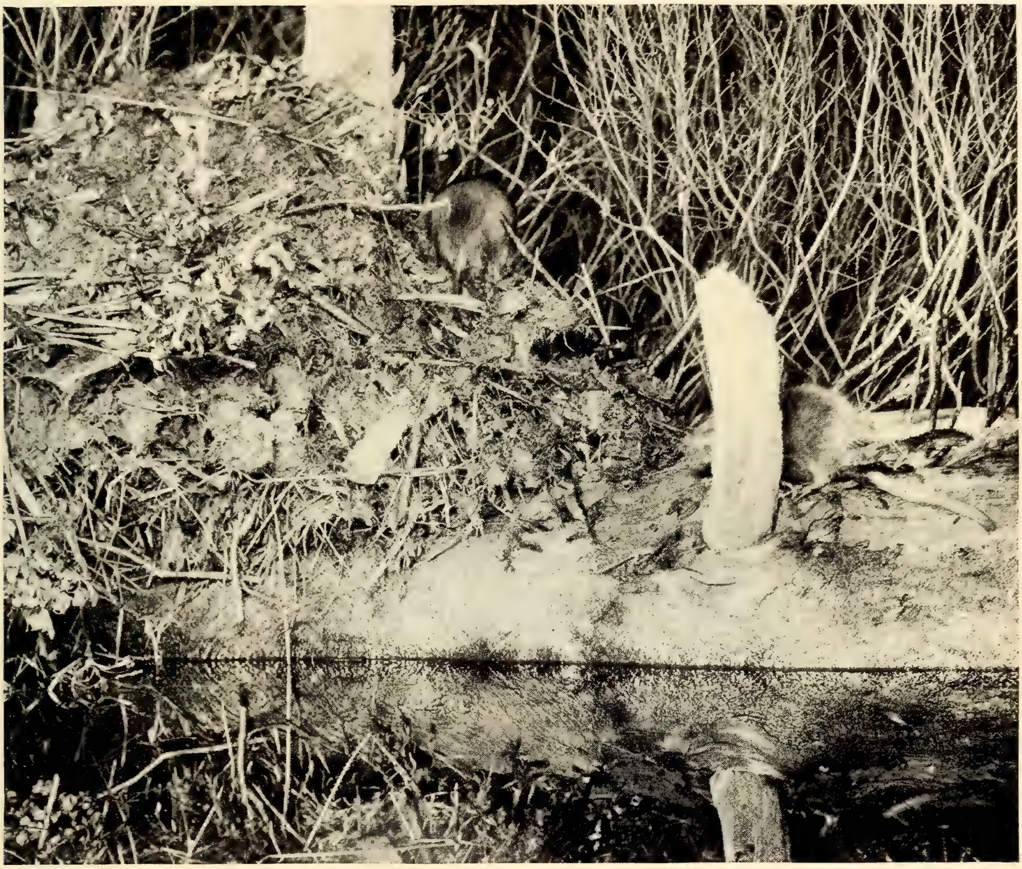
Both of these aquatic fur-bearers belong to the order of rodents, the beaver being the sole representative in the family *Castoridæ,* while the muskrat, once associated as a genus in the same family by Linnæus and others, has been demoted by later scientists and assigned to the rat and mouse family, the *Muridæ,* consisting of more than a thousand species and variants, widely distributed small animals, including many useless and destructive "varmints."

THE CINDERELLA AMONG FUR-BEARERS

To the properly descriptive prefix "musk" was appended the derogatory term "rat," making it a Cinderella among the fur-bearers and an outcast for many years in fashionable circles. With the gradual recognition of the high value of its fur, mostly under fictitious trade names, its caste has improved very greatly of late. Without entering into a discussion concerning the structural differences between the beaver and the muskrat, it is interesting to note their general resemblances in appearance and habits.

These animals are similar in shape and color, in the double coat of hair, webbed feet, flat, scaly tails, in having peculiar gland secretions and other anatomical resemblances. In habits they are homogeneous, being aquatic, nocturnal, monogamous, living in houses or burrows within the banks, each constructed and occupied in much the same way, often as harmonious cotenants, while their extensive range is the same in North America.

There is a marked similarity in the food habits of these animals. Very many



Photograph by George Shiras, 3d

A COMPLETED MUSKRAT HOUSE (SEE ALSO ILLUSTRATION ON OPPOSITE PAGE)

This flashlight shows the pair of muskrats putting the finishing touches to their home.

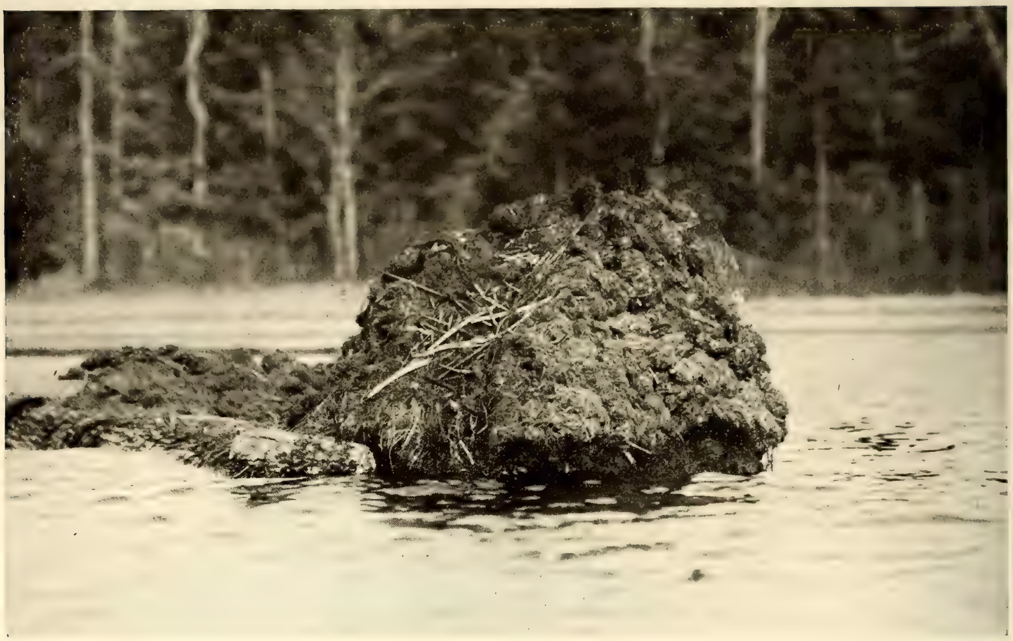
suppose that the beaver primarily depends on bark, and that such soft vegetation as it feeds upon is incidental and irregular. This is an error, for the beaver in its extensive ranges relies upon bark only during the months when other food cannot be easily obtained or stored.

By adaptation to the seasonal food supply, the beaver resorts to the more perishable aquatic growths from May to October, and to the many varieties of land plants, bushes, and vines, thereby conserving the arboreal supply for a time when the deciduous plants yield to the frosts or gradually chilling waters. In higher altitudes, where spring or glacial streams are often too cold for vegetation, the beaver depends upon bank willows, weeds, and the other small growths, though occasionally the bark of poplars or birch is eaten at the base, the tree seldom being cut before fall.

Prior to 1700 the beaver was seldom molested by the Indians of the upper lakes; for, aside from decorative purposes, they preferred larger skins for domestic use.

The early explorers found the usual meadows and alder-covered flats, where the original forests had been killed by the flooding caused by beaver dams; but, as the watercourses were fringed almost entirely with conifers, the lake region in the beginning was not a particularly good beaver country. When the aquatic plants, willows, alders, and black ash, constituting their principal diet, became exhausted, the animals migrated elsewhere, and thus these cycles of occupation and abandonment were regulated entirely by the question of food.

On the arrival of the trappers it did not take long to reduce these numerous but scattered colonies, and for a hundred



Photograph by George Shiras, 3d

MUSKRATS LIKE HOUSE-BOATS

A cedar raft built for the muskrats to use as a float for their winter home. Anchored in the slough at the south end of Whitefish Lake and now in use three years (see page 196).

and fifty years there was a succession of good seasons, followed by a relapse.

A NOTEWORTHY STUDY OF THE BEAVER

When the writer first came to Lake Superior not one stream in a dozen showed any recent signs of beaver, most of the animals being found at the headwaters of the streams and on little lakes well inland, where the Ojibways never lived and the white trapper sometimes overlooked them.

In 1867, three years before my arrival, there appeared in print a monograph on "The American Beaver and His Works," by L. H. Morgan, the most original and valuable biography ever written about this animal, and still regarded as a classic in zoölogic literature. Mr. Morgan resided in Marquette County for a number of years, associated in the building of railroads and furnaces. On his many trips into the woods he always employed Jack La Pete as his principal guide, and from the latter I learned much about this indefatigable investigator.

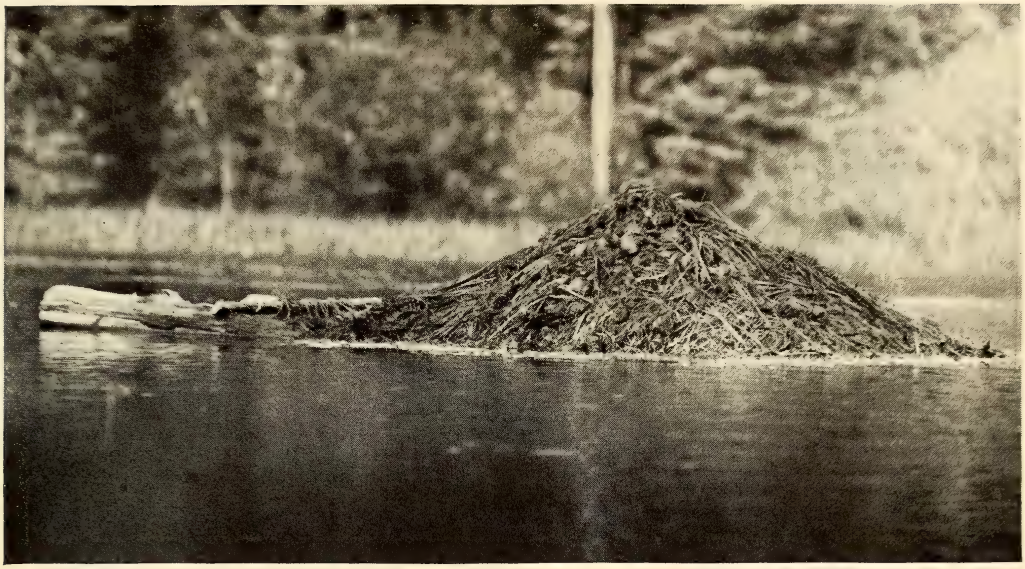
Mr. Morgan's collections of skulls and bones led us to nickname him "the fossil"; for, boy-like, we thought such relics savored of mental antiquity. It is now a pleasure to join in the public commemoration of this remarkable production and to be able to note the great changes taking place in the same localities he visited.

About 1885 the last beaver disappeared from the waters about camp, and for twenty years thereafter none was seen. Finally, a long closed season saved the remnant in upper Michigan.

Six years ago I found fresh cuttings and later located a beaver burrow deep within a bank at the south end of the lake. The next year in enlarging the chamber it broke through the surface soil, which was then covered with a mass of sticks.

HARD TIMES IN THE BEAVER WORLD

The same fall the eviction of the two-year-old beaver led to the establishment of a colony on the river not far above camp, where a large house was built of sticks and covered with mud (see page 180). This new home, however, was not finished until the middle of November, when the ice prevented the collection of the winter supply of food.



Photograph by George Shiras, 3d

BEYOND REACH OF WOLF, FOX, OR LYNX

A raft similar to that shown on the opposite page, anchored in ten feet of water, where it swings freely with the wind. These floating foundations permit the building of the superstructure a month earlier than where the animals are delayed through the fluctuating levels of the lake each fall. One raft house is built of moss, the other reeds.

The next year their plight was disclosed by the stumps of half a dozen black ash cut five feet above the ground, indicating the snow level at the time of their desperate harvesting. In the spring the melting of ice released and brought to the surface a large number of yellow lily roots, some of them six feet long, from which the tender shoots and the outer covering of the roots had been removed, indicating the beaver had passed beneath the ice-covered stream to the lake in search of food at a time when zero weather may have prevented forays above ground.

No lumbering having been done on the river and lake except the removal of a few large pines, there was an absence of all second growth, the beaver depending largely upon the long stretch of black ash bordering the river and parts of the lake. After the smaller trees had been cut, the remainder, varying from 40 to 90 inches in circumference, came next.

When the river colony was estimated to contain eight animals, there were two seasons, 1918 and 1919, during which from 25 to 30 trees were in the process of felling at the same time, showing that few, if any, of these animals continuously confined their efforts to a single tree until the work was finished. On an average it took from ten to fifteen days before large trees were felled, by reason of this intermittent cutting.

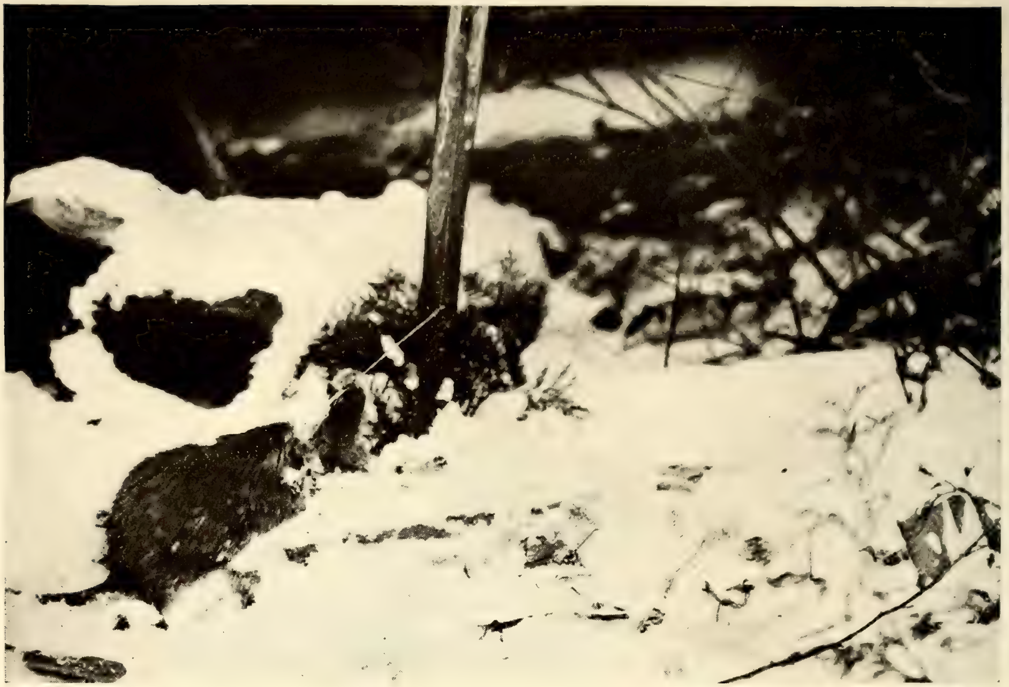
BEAVERS WERE NEVER SEEN IN DAYTIME

The beavers on the river were never seen in the daytime, for the narrow and shallow waters deterred such excursions, but on the lake it was not unusual to see some swimming about late in the afternoon.

It was some years before this, in October, 1912, and on a stream west of Marquette, I got a flashlight of a beaver repairing a dam which had been broken during the afternoon, for the purpose of getting a night picture as the animal attempted its repair (see page 177).

But those about camp had no dams, or at least were not permitted to block the river with one, and consequently the idea of taking a flashlight picture while a tree was being cut seemed to offer the best chance. For three weeks an outfit faced a half-cut tree without result. So, on departing for the East, I told John to leave the camera out a few days longer.

A night or two later a loud explosion was heard up the stream and the undeveloped plates were sent me with the hope



Photograph by George Shiras, 3d

FIRST COME FIRST SERVED

Here a pulling string connected with a flashlight and camera was baited with carrots and fish, for either muskrats or mink. The muskrat fired the flash first, and later a mink removed the fish, as shown by its tracks in the snow the next morning.

that a beaver would be found at work. This proved to be the case, giving much encouragement for continuation of the efforts the next season (see page 178).

While luck varied during the ensuing years, it was not long before I had a dozen or more pictures showing some of the animals erect, busy gnawing away, and others walking about at the base of a tree (see page 183).

PHOTOGRAPH SOLVES A PROBLEM

These photographs made possible the determination of the much-mooted question whether more than one beaver assists in the cutting of a tree. In not a single instance was more than one beaver shown at work or in the vicinity of the tree, nor was that tree touched again during the same season.

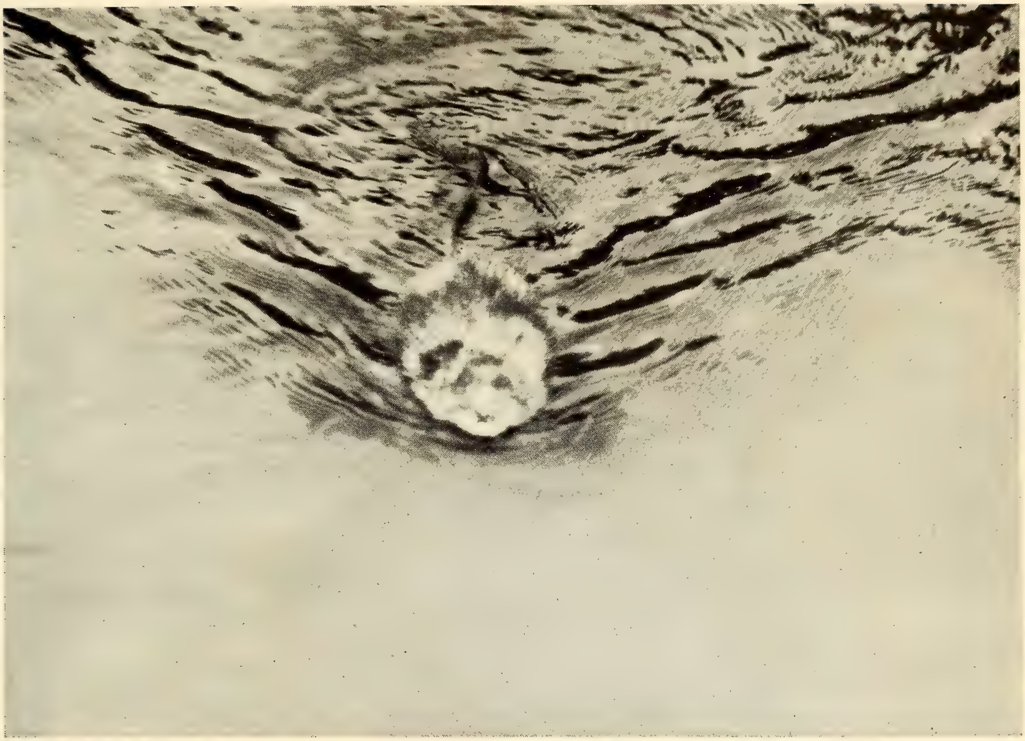
From the very beginning, the river colony tried every fall to block the sluiceway in an old lumber dam several hundred yards above camp by filling it with water-soaked logs and branches, the purpose being to flood the river bottom when cutting down the tree.

Each fall and to the present time it has been a case of "pull out in the morning and fill in at night." This effort to utilize the dam was a very practical conception, only it conflicted with prior rights at camp by preventing access to the lake (p. 190).

This almost daily removal of a great mass of sticks and brush caused John to figure on some way of discouraging their nightly activity, so a lighted lantern was placed in the middle of the dam, with the expectation that this would end their endeavors. The first night the plan was a success, but on the following one the animals were busier than ever. Then the lantern was lowered to the surface of the water, and they paid no attention to it whatever.

WATCHING THE BEAVER AT WORK AT NIGHT

Taking advantage of this situation, we visited the place at night to witness the beaver at work. Such a close view and under a strong light revealed perfectly their methods of construction; so a night later the flashlight and camera took our



Photograph by George Shiras, 3d

A MUSKRAT HEADED FOR THE CARROT PATCH (SEE PAGE 192)

The muskrat differs from the beaver by swimming with its body well above the surface. Contrast this photograph with that of the beaver on page 186.

place, in order that the scenes visible to a few might be put in a permanent and more available form (see page 177).

In 1919, after the beaver became abundant in a number of upper Michigan counties, the season was opened, resulting in all the trappers concentrating in these localities and in the rapid decline of the new-comers. A much better policy would have been the trapping alive any surplus and the distribution in those districts containing hundreds of thousands of acres of worthless second growths along the banks of streams and lakes where the beaver had not yet come.

Such a system, in a few years, would enlarge the beaver population to a point probably never reached in the region before; for the greatly increased food supply and well-balanced regulations in trapping would regulate and perpetuate a contribution of nature such as man never attempted before on such a suitable range.

The muskrat is much more versatile in the variety of its retreats than the beaver, possibly because of its smaller size. Often it takes possession of the overhanging and lower portions of a beaver-house, living there in peace with the larger landlord, or it may use the wing of any old lumber dam for an all-year home.

THE ABODES OF THE MUSKRAT ON WHITEFISH LAKE

The muskrats of Whitefish Lake have an unusual number of domiciles; for, in addition to those already mentioned, they resort to hollow logs with an entrance under water, or tunnel beneath a fallen trunk extending beyond the bank, this latter retreat being, I believe, a very common one.

One morning, on a Wyoming lake, I found a pair of muskrats asleep in a newly made nest of grass beneath a flat-bottom rowboat, where the bow extended above the water, and two succeeding nights the same thing happened. Such a home is easily constructed, besides being warm and secure.

The logs along the shore are often the

Photograph by George Shiras, 3d

MUCH ENGROSSED

Daylight picture of a muskrat on the edge of new ice, feeding upon moss taken from the bottom of the lake.

foundation of the superstructure, and in one instance the animal entered the hollow end and then, through a hole in the top of the log, reached the house (see page 194).

A MUSKRAT HOME ON A RAFT

Probably the strangest of all these homes are depicted on pages 196 and 197, where the animals used large rafts anchored in the lake and put there for that purpose by the writer.

Sometimes the house material used by the beaver and muskrat is completely reversed, for when reeds and moss are scarce the muskrat occasionally builds a house out of sticks and mud (see page 193), while the beaver, in a prairie country, has been known to construct its lodge entirely of aquatic vegetation, resembling that of the muskrat except for its size.

Both these animals are particular in having one or more entrances to their homes beneath the water, and when the water recedes the canals are deepened, so as to maintain subsurface approaches.

The muskrats of Whitefish Lake have a habit of building small houses out of moss on the ice-covered lake, using them as resting and feeding places when seeking water plants in the winter.

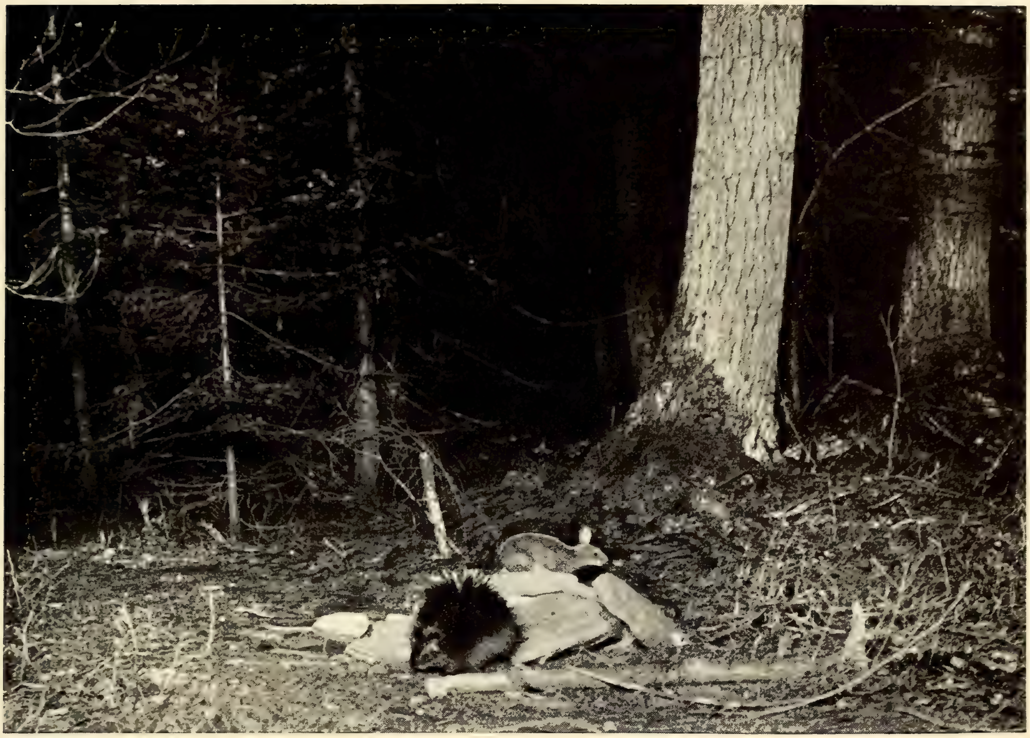
In many parts of its range the muskrat is supposed to raise from three to four litters a year. Along a great portion of the southern shore of Lake Superior I have never seen any evidence of more than one set of young a year. In this section occurs one of the deepest snowfalls of the country, and this unusual condition doubtless affects the muskrat.

About Whitefish Lake the waters remain cold and high until after the middle of May, when vegetation responds rapidly to the many hours of sunlight. The first young are seen the middle of July, and from that time on until the early frost or the coming of the ice I have never felt sure of having seen the young of a second litter.

THE EDIBILITY OF THE MUSKRAT

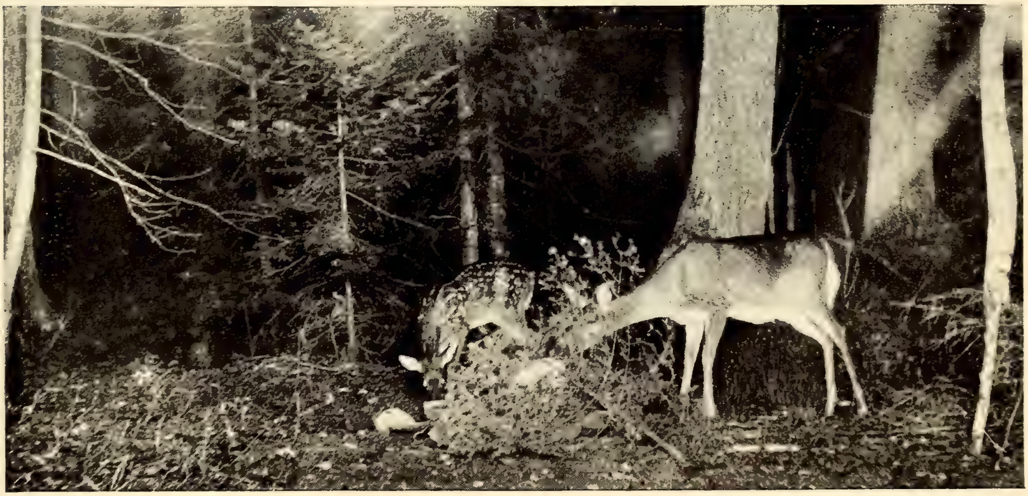
In recent years the flesh of the muskrat is becoming more and more esteemed. Its unfortunate surname—rat—has done more to excite a prejudice against its use than all the other causes combined, especially among the feminine members of the family.

Its meat is dark red in color, fine-grained and tender. According to the Biological Survey, any unfavorable opinion as to its flavor arises, probably, from



PORCUPINE AND VARYING HARE TAKING THEIR OWN PICTURES AT NIGHT

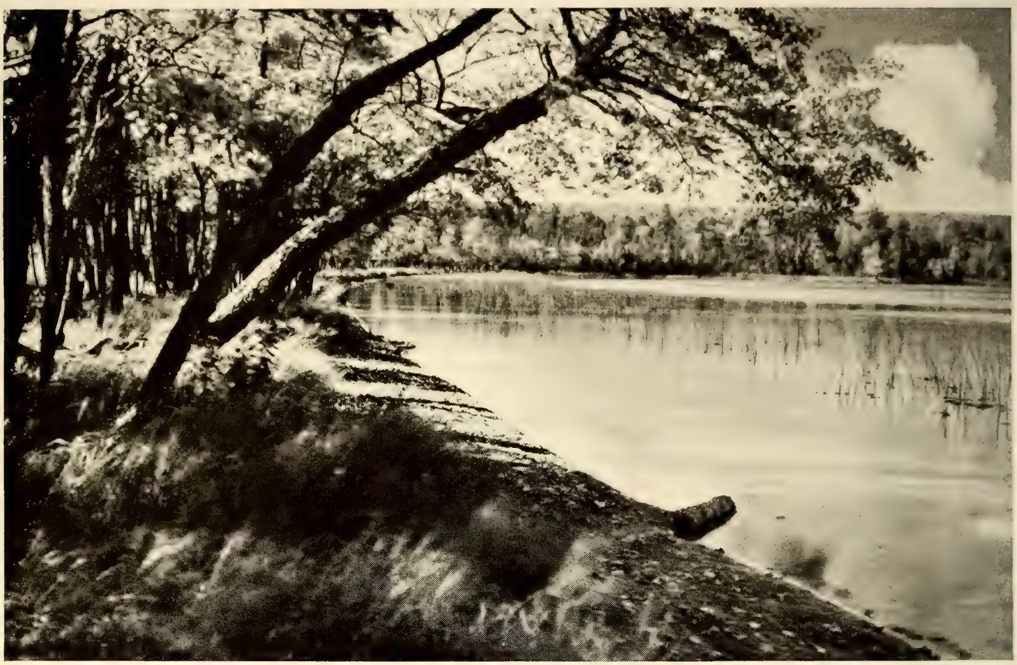
Rock-salt was placed between stones, to attract the deer. When the flash was fired, the developed plate showed in front a salt-loving porcupine, while in the rear is a varying hare, of similar taste, in the act of running into a string attached to the stake behind.



Photographs by George Shiras, 3d

DIFFERENT VISITORS ON THE FOLLOWING NIGHT: WHITEFISH LAKE

To prevent small animals firing the flash, as shown in the picture at the top of the page, a balsam top was placed over the salt, raising the string several feet, where it was not so noticeable in the mass of branches. Such contrasting and unsuspected scenes illustrate the fascinations of the automatic flashlight



Photograph by George Shiras, 3d

THE BANK ON THE LEFT, COVERED WITH SECOND-GROWTH TREES, IS AN ANCIENT BEAVER DAM 1,500 FEET LONG, PROBABLY 400 YEARS OLD, AND FORMING THE LAKE ORIGINALLY

The picture shows the western end of Echo Lake, which occupies a mile in the center of Grand Island. It is largely frequented by deer and elk.

the lack of skill in cooking or from carelessness in skinning the animal. It can be fried, roasted, or stewed, only having a slightly gamy flavor, which can be removed by soaking the meat over night in salt water.

I have found it comparable to tender chicken. For years it has been served, highly seasoned and flavored, under the name of "Maryland terrapin," without exciting any suspicion on the part of connoisseurs, who pay a fancy price for it. The use of a few terrapin bones in the dish when served has likely aided in this deception.

In some of the Eastern States the carcass brings from 30 to 40 cents, more than double the price once paid for its pelt. It seems unfortunate, therefore, that several million pounds of available food must go to waste annually; yet for many years its coat was rated among those of the humblest of fur-bearers, and at times the traders of the North refused to take them from the trappers, the skins being practically valueless in the market. In recent years the really beautiful fur of these animals has become more and more appreciated.

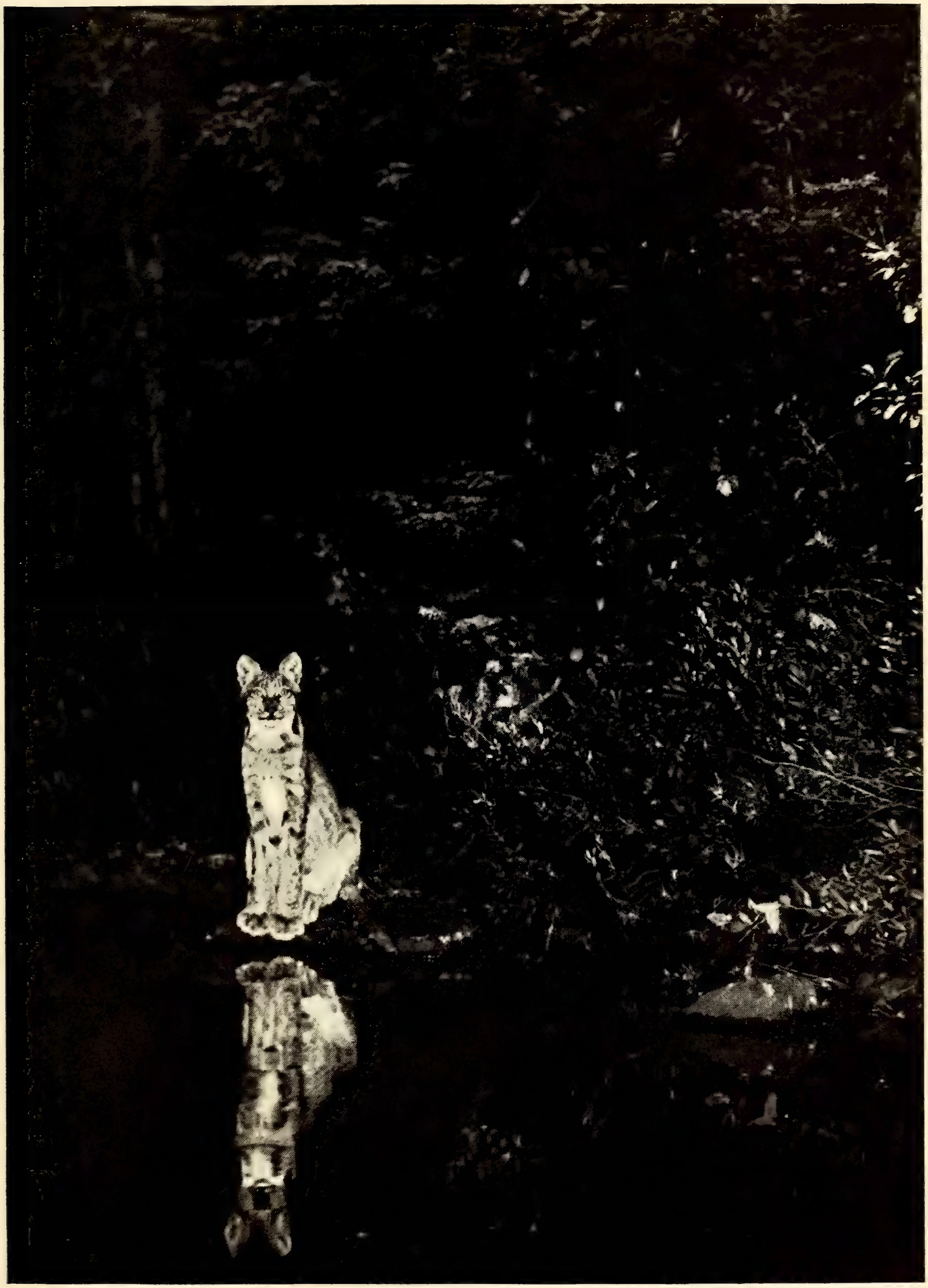
In 1920, at the crest of high prices, muskrat skins were sold in fur auctions up to a maximum price of $7.50 each. Today the muskrat, on account of the enormous number of its skins and their appreciated price, has become the most important of North American fur-bearers.

Thus it is apparent this American fur-bearer has reached the top in the total value of its pelts and in striking contrast to its status a few years ago.

Restore to it the old Indian name of musquash and the prejudice against the use of its fur or its flesh for food will rapidly disappear.

BIRDS AND ANIMALS MULTIPLY IN CUT-OVER AREAS

Partly because the subject has seldom been considered in print, and again because its significance is so little understood, the wonderful part that second-



Photograph by George Shiras, 3d

A UNIQUE NIGHT PICTURE OF A LYNX

This animal can seldom be photographed in the daytime and at night has a strong aversion to artificial light. In this instance, however, the subject sat erect on the edge of the bank watching the approaching jack-light, its reflection in the water doubling the image. Taken on a small lake in western Ontario.

growth vegetation in deforested areas plays in the distribution and relative numbers of birds and animals is worthy of further comment.

In the thousands of miles of wilderness surrounding Lake Superior, the present conditions, so far as Nature is concerned, are better for its wild life than before the coming of the white man, centuries ago; for there is a larger and greater variety of food and better shelter than ever before—two great factors in a suitable habitat.

Other factors of importance are the favorable climatic conditions which about Lake Superior are stabilized and devoid of extremes through the influence of the deeper waters of the lake which remain close to 39° throughout the year. The prevailing northwest winds of summer are cool and bracing, without rain or noticeable humidity, for the warmer and drier air ashore readily absorbs the moisture in the air from the lake, producing the exhilaration of high altitudes, free from the heart strain of a rarefied atmosphere.

Once unbroken evergreen forests covered much of the land. Back from the waters the tops of the towering pines and hemlocks, interlocking, excluded the warm rays of the sun and the bountiful dews; so that only a scant vegetation struggled in the perpetual shadows and in the sour soil, brown with the successive fall of needles.

In these primeval forests there was little food or shelter, for the giant trunks were almost limbless to the green canopy above. In the other sections, where hardwood forests predominated, conditions were equally unpropitious; for neither tender bark, leaves, nor budding branches were in reach of browsing animals.

In the early lumbering operations only the largest trees were cut, the removal hardly leaving a trace, and when one passed through this densely timbered land he seldom expected to see a living thing beyond, perhaps, a porcupine, a red squirrel, or a woodpecker drilling on a dying tree.

Finally came the period of intensive lumbering, where trees of every kind yielded to the axe or went down beneath the crash of a larger neighbor.

Many times came the warning from experienced hunters that the game was doomed; for the sight of cut-over land piled high with wreckage, the discarded limbs smothering all vegetation and discouraging any of a different kind, certainly gave color to these views. But in a few years fires or decay prepared the devastated areas for a new growth, giving assurance of better things.

Where once stood solid forests of pine, cedar, balsam, and hemlock, these were reproduced, the young trees, however, being low-branched and thick, blocking the driven snow and cutting winds, thus sheltering the game from the eye of man and putting food within easy reach.

LARGE CLEARINGS CREATED

Later came the removal of the matured hardwood maples, in hundreds of tracts of twenty to forty acres, creating clearings of unusual size, where the succeeding deciduous growths differed greatly from the original stock, consisting of rapidly growing trees like the poplar, white birch, cherry, alder, and mountain-ash, interspersed with a great variety of berries and low-growing plants, including clover and timothy, introduced by the wind-scattered fodder of many a logging team.

Here came the deer, rabbits, bears, grouse, and hundreds of berry- and insect-eating songsters, many of them new to the land, while the beaver took possession of streams and lakes bordered with these new growths.

In this region Nature, despite man's grasping ways, provides more abundantly than ever food and shelter for the birds and animals, and these bounties should be met in an appreciative way, making it possible for the wild life of the upper region to continue furnishing its valuable quota in meeting our necessities and in the gratification of our outdoor pleasures.

PROTECTING THE UNITED STATES FROM PLANT PESTS

By Charles Lester Marlatt

Chairman, Federal Horticultural Board, U. S. Department of Agriculture

With Photographs from the U. S. Department of Agriculture

Some ten years ago the NATIONAL GEOGRAPHIC MAGAZINE, *by the publication of an article on "pests and parasites," aided materially in securing the passage of a national law to prevent importation of insect-infested and diseased plants.* The accompanying article and the illustrations indicate the character of plant pests which are being intercepted by this law.*

PRIOR to 1912 there was no authority in law to protect the United States from the entry of new plant enemies or to control and prevent the distribution within the United States of any such enemies which may have gained limited foothold.

Not only could plants be imported by nursery and florist establishments without regard to their freedom from pests, but, in the absence of any protective legislation, America became a dumping ground for the plant refuse of other countries.

It was common practice of big nursery establishments abroad to consign, without order, tons of their culls to department stores, to florists, and even to auctioneers of this country, to be sold or given away by such stores or auctioned for what they would bring.

This freedom of entry, in the absence of authority for inspection or other insurance of freedom from insect pests and diseases, has resulted during the last century in the establishment in the United States of an enormous number of foreign plant pests which are, and will remain, a tremendous burden on the garden, field, and forest productions of this country.

THE FOOD BILL OF PLANT PESTS OF FOREIGN ORIGIN

Several years ago the Department of Agriculture issued a careful analysis of the losses caused to the principal crops of the United States by insect pests, showing that these losses amounted to upward of a billion dollars a year, a sum at that time more than sufficient to meet the entire cost of the administration of the Federal Government! That was under the old price of crops. Under recent prices these losses would approximate two billion dollars annually!†

These estimates relate solely to losses due to the insect pests and take no account of the losses due to such plant diseases as the grain rusts and smuts and the mildews, blights, and hundreds of other diseases affecting every important crop and also many forest trees and ornamentals. Such plant diseases probably occasion losses fully comparable to those due to insects.

These losses are caused by a host of pests, insect and fungous, that affect fruits, farm crops, and forest trees, *but more than 50 per cent of these losses are due to insect and diseases which have come to us from foreign lands.* Among these are some of the worst enemies of our principal crops.

Examples of such are the Hessian fly, the boll weevil of cotton, the alfalfa weevil, the Japanese beetle, the San José scale, and such plant diseases as the wheat smut, pine blister rust, citrus canker, potato wart, chestnut blight, and many others.

Altogether, these unwelcome immigrants, insects and diseases, include upward of 100 important plant enemies and

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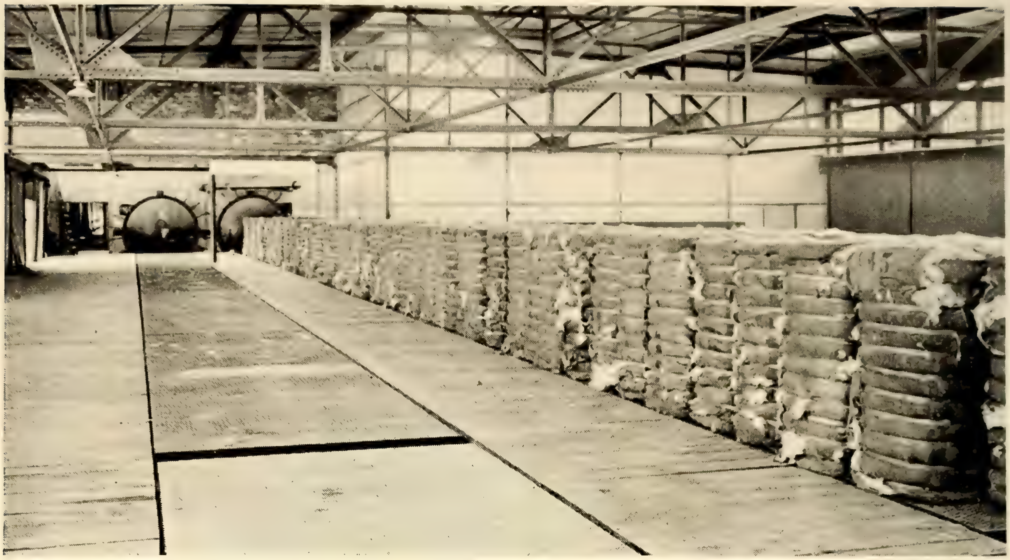
* Pests and Parasites; Why We Need a National Law to Prevent Importation of Insect-Infested and Diseased Plants. By Charles Lester Marlatt. NATIONAL GEOGRAPHIC MAGAZINE, April, 1911.

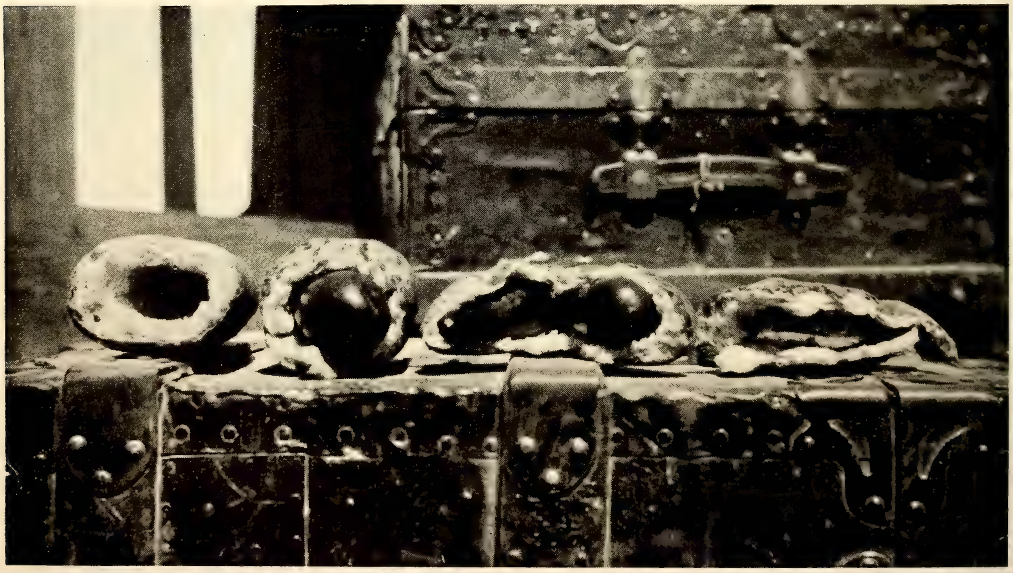
† The detailed discussion of these losses is published in the Year Book of the Department of Agriculture for 1904, and a later summary is given in the report of the Roosevelt National Conservation Commission.



DISINFECTION OF EGYPTIAN COTTON TO EXCLUDE THE PINK BOLLWORM

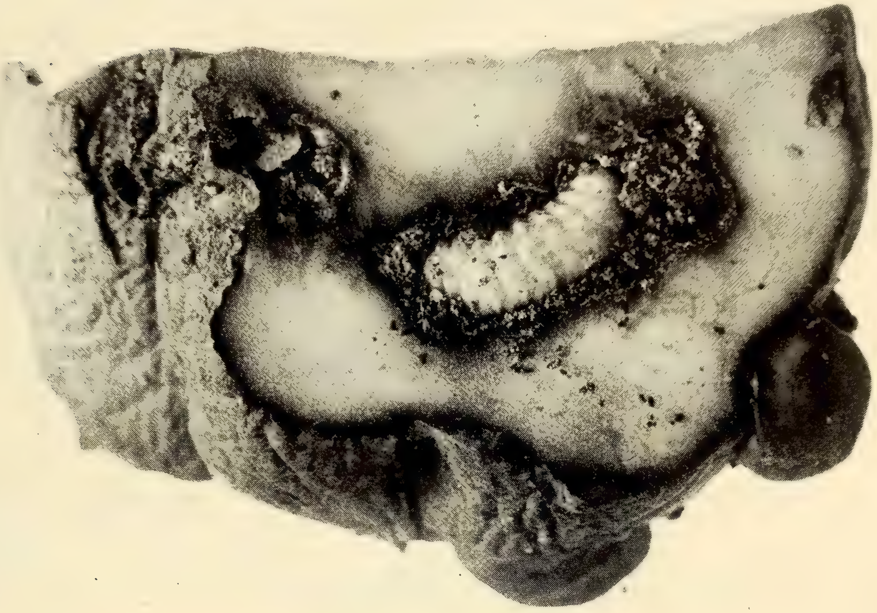
The worst of all cotton pests is the pink bollworm, the larva of a minute moth. The larvæ feed in the bolls and destroy the forming lint. This pest originated in India and reached Egypt about 15 years ago with some importations of cotton, and has since been distributed with Egyptian cotton seed to practically every cotton-producing country of the world. It reached Texas via Mexico in 1916, and since that time Congress has appropriated upward of $2,500,000 to be used in an effort to exterminate this pest.

This illustration shows the method of disinfecting Egyptian cotton. The entire row of cotton bales is carried at one time into a huge steel cylinder, shown at the end of the picture, by means of a movable platform. The cylinder then is hermetically closed and the air exhausted, creating a vacuum. The poisonous cyanide gas is then allowed to enter the cylinder, and the vacuum insures penetration of this gas to the very center of the bale, destroying all insects. This is the largest fumigating plant in the world, and each cylinder has a capacity of over 100 bales of cotton at one time.



A SPECIAL SENSE MUST BE DEVELOPED BY THE PLANT INSPECTOR

This photograph illustrates an effort to bring alligator pears into the United States from Mexico imbedded in partly baked loaves of bread, in violation of a Federal embargo on account of pests.



NATIVE POTATO WEEVILS FROM THE ANDEAN REGION OF SOUTH AMERICA

The Irish potato and the Indian corn are the two great food crops of the world of American origin. The potato is supposed to have come originally from South America. It is now discovered that in the Andean region this tuber is infested by a number of native weevils, which mine through the potatoes and render them worthless. It is a piece of tremendous good fortune to the world that the distribution of the potatoes has been from North America, where these weevils do not occur. Recent shipments of potatoes from the Andean region have resulted in the discovery of no less than four such weevils, one of which, with its work, is illustrated in the accompanying photograph.

COLLECTING JAPANESE BEETLES FOR WAGES

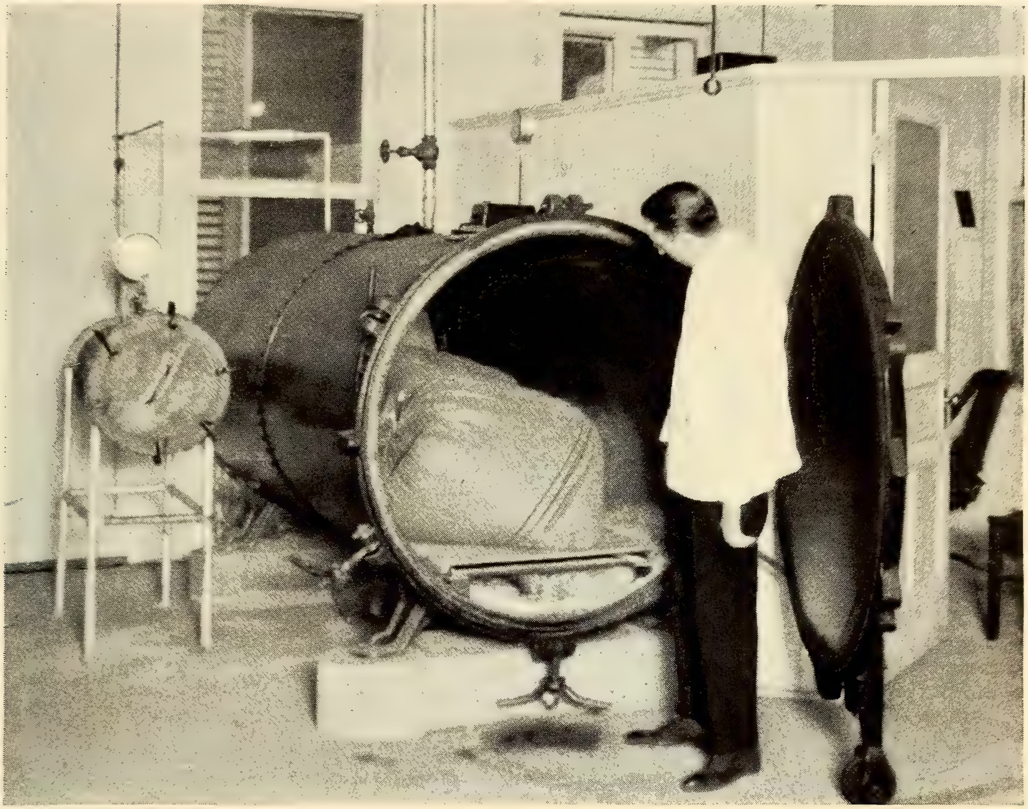
Boys earn modest wages by collecting Japanese beetles with nets in the heart of infested territory. The object is to reduce their numbers along roadways, so as to lessen the risk of their being carried by passing automobiles. The collected beetles are destroyed with oil.

EXAMINING PLANT IMMIGRANTS TO SEE WHETHER THEY ARE HEALTHY

More than 10,000 naturalized plant citizens of the United States have been brought from every quarter of the world by plant explorers of the Department of Agriculture. All of these plants, as well as commercial importations, are carefully examined for injurious insects and plant diseases. If necessary, such plants are disinfected by fumigation, or destroyed if fumigation cannot be relied upon to eliminate any accompanying pests.

A SEARCH FOR FUNGI AND INSECTS AT A HORTICULTURAL "ELLIS ISLAND"

These lilies-of-the-valley roots may neither toil nor spin, but they require patient work on the part of experts from the Office of Plant Introduction to prevent the admission to the United States of undesirable parasites.



A BIG DRUM IN WHICH PLANTS ARE FUMIGATED

The inspection and disinfection to which plants imported by the Office of Plant Introduction of the Department of Agriculture are subjected has during the last year been extended to most of the commercial importations. The room shown in this illustration is equipped with a cylinder for fumigation under vacuum conditions, and with other disinfecting chambers and apparatus.

many hundreds of lesser importance, and their board and lodging, as just noted, costs this nation nearly a billion dollars annually.

THE COST OF SOME INDIVIDUAL LODGERS

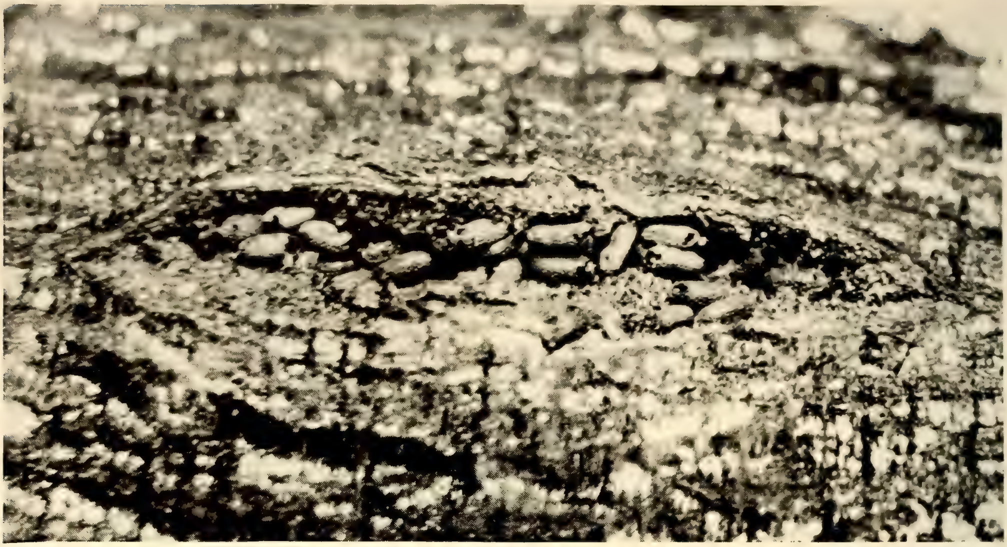
The San José scale, which was introduced with flowering peach from China some 40 years ago, is now costing this country at least $10,000,000 a year for the spraying of orchards and in reduced output and value of fruit crops. Very conservatively estimated, this means an unnecessary food bill of $200,000,000 which we have paid out during these 40 years, upon the basis of one-half the annual charges for the last 20 years.

Similarly, citrus canker, introduced with Japanese trifoliate orange stock some 13 years ago, has cost in actual expenditures of Federal and State moneys in control work approximately $2,130,000, of which $1,273,000 were appropriated by Congress, and in value of orchards and nurseries which have been burned to the ground in the effort to exterminate this disease in Florida and other Gulf States, $11,063,000, or a total of $13,193,000!

Furthermore, this estimate makes no account of the losses chargeable to reduced orange and other citrus crops on account of the disease and orchards destroyed. That is paying very dearly for a few plants of trivial value which in fact, easily and without risk, could have been grown from seed.

THE ORIENTAL FRUIT WORM CAME WITH THE JAPANESE CHERRY

The Oriental fruit worm, brought to this country with flowering Japanese cherries about 1911, when a widespread



THE LESSON OF A CRACK IN THE BARK

This bit of bark, to the unaided eye, had the appearance of any normal bark filled with numerous cracks; but many of these apparently harmless-looking cracks, when examined under a magnifying glass, proved to be filled with the eggs of a camphor thrips, a pest which now threatens failure to what was believed to be a promising camphor industry in Florida. Pests introduced in this obscure manner may cost the country millions.

EIGHTEEN MILLION NARCISSUS BULBS IN FIFTEEN THOUSAND CASES!

Unlimited importation is still permitted of the more popular bulbs, including narcissus, tulip, hyacinth, lily, and crocus. The photograph illustrates a single shipment of narcissus bulbs on the dock at New York awaiting distribution. There is still some risk of the entry of new pests, even with such clean bulbs, and it is hoped that the time may soon come when these bulbs will be produced in this country in sufficient quantities to meet home needs.

popular demand for this beautiful flowering tree developed, promises to be one of the most serious checks that has ever threatened our common deciduous fruits—peach, plum, prune, apple, pear, etc.

It is now firmly established in some half a dozen eastern States and probably has been even much more widely distributed through the agency of miscellaneous importations of flowering cherries, so that its ultimate spread throughout the United States cannot now be prevented. This insect is another serious pest introduced with ornamentals that will in a few years cause a continual annual charge to fruit production of millions of dollars.

The Japanese beetle is another new pest of wide range of food habit and likely to cause in the near future tremendous annual losses to all kinds of fruits, including not only apple, pear, and plum, etc., but also grape and small fruits. It not only destroys the foliage, but eats into the ripening fruit and renders it unsalable. It breeds in garden, lawn, and pasture lands as a soil-inhabiting white grub.

The evidence indicates conclusively that it was introduced about a decade ago in soil with an importation of Japanese Iris roots, and has now spread over a fairly large section of New Jersey and into contiguous portions of Pennsylvania. There is now no possibility of exterminating it, and its board bill will be a continuing charge, perhaps ranking ultimately with that of the San José scale.

The introduced diseases of forest trees, such as the pine blister rust, the chestnut blight, and the insect and disease enemies of the cereal and forage plants, are vastly more expensive lodgers than those just mentioned and, as already indicated, furnish the larger items making up the half billion to a billion dollar annual cost due to imported plant pests.

These undesirable immigrants we must lodge and board forever, but we want to shut the doors if we can to their brothers and sisters and cousins and aunts!

MANY OTHER PLANT ENEMIES TO BE EXCLUDED

These hundreds of foreign pests have become permanent factors in American agriculture and horticulture. They ought to have been kept out, and America would then have enjoyed a tremendous advantage over the old world; but late as the action was taken, it was still opportune.

SMUGGLING CONTRABAND "FRUIT"

A customs inspectress at Laredo, Texas, has taken a bag of alligator pears hidden in a woman's skirts. The smaller bag contained evidence of violation of the Volstead Act.

The Department of Agriculture recently compiled and published a catalogue of the more dangerous insect enemies of plants in foreign countries which for the most part have not yet gained entry into the United States. This catalogue was issued as a hand-book for the information of the plant quarantine inspectors, Federal and State.

In it are listed some 3,000 different foreign insect pests! These include insects injurious to forest and shade trees, to fruit and ornamental trees, and to the various farm and garden crops.

A similar manual, which is in course of preparation, lists the known foreign fungous diseases of plants, and will describe and catalogue, when completed,

ITALIAN BROOM-CORN INFESTED WITH CORN-BORER

It is now pretty well established that the European corn-borer reached this country through shipments of Italian and Austro-Hungarian broom-corn. This picture shows a shipment of Italian broom-corn which arrived at New York in February, 1920, and on examination proved to be infested with this dreaded European pest. All foreign broom-corn is now subjected to steam cooking as a condition of entry. This does not injure it for broom manufacture, but kills any harbored insects. The corn-borer illustrates the continuing risk of the entry of new pests with almost any sort of plant material, whether for manufacture or as packing for other articles of commerce, and indicates the breadth of the field which must be guarded if foreign plant pests are to be excluded (see next page).

probably as many diseases as there were insects included in the insect-pest catalogue.

Many of these insects and diseases are known to be as serious enemies as many of the worst of those already introduced.

These catalogues and lists will, however, enumerate only the known plant enemies. Most of the recent introductions from foreign lands of important pests have been of insects or diseases of which literature and available records gave us no warning.

Enormous areas in the old world have been little or not at all explored with respect to such plant enemies. This applies particularly to China, Africa, and even to much of Europe, and from these areas particularly have come pests like the San José scale, the Oriental fruit worm, the citrus canker, and the chestnut blight, none of which were recognized as important plant enemies prior to their importation and establishment in this country.

LIVING PLANTS COMMON CARRIERS OF NEW PESTS

Most of these introduced plant enemies have come to this country in connection with living plants and many of them with florist and ornamental stock. In many instances the imported ornamental or other plant has been a mere accidental carrier of the new enemy. For example, the European alfalfa weevil, which is now largely reducing the output of alfalfa in half a dozen States in the middle West, was undoubtedly introduced with soil about imported plants. This weevil hibernates in the soil, and the only known means by which it could have reached the State of Utah, where it got its first foothold, is in soil with imported plants. Other weevils of foreign origin, affecting clover and other plants, have undoubtedly been similarly introduced. The Japanese beetle is a recent instance of such introductions.

The European earwig was also introduced in soil with imported plants and is perhaps an exception to the rule, in that it has been very troublesome to ornamentals in the highly developed estates of Newport, where it got its first foothold. It is notably a pest of garden and ornamental plants as well as a very obnoxious house pest and promises a very unsavory future record.

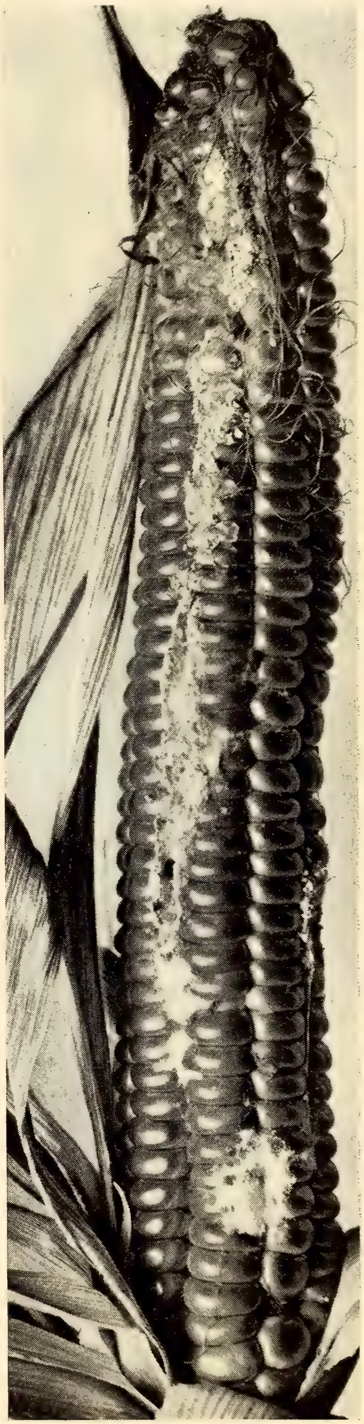
These instances are, perhaps, sufficient to illustrate the danger of bringing in pests with wide possibilities of damage more or less accidentally with ornamentals or other living plants.

Some of these foreign plant enemies have come in in other ways: The Hessian fly with straw; the Argentine ant possibly merely as a stowaway in the cargo of some ship coming to New Orleans; and the corn-borer with imported broom-corn. It is entirely possible, however, for both of the latter pests to be carried by living plants—the Argentine ant in soil and the corn-borer in any of the many ornamental plants which it is known freely to infest.

But looking over the record of these introductions, from early colonial times to the present, it is apparent that 90 per cent of these foreign pests have come in with living plant material of one sort or another.

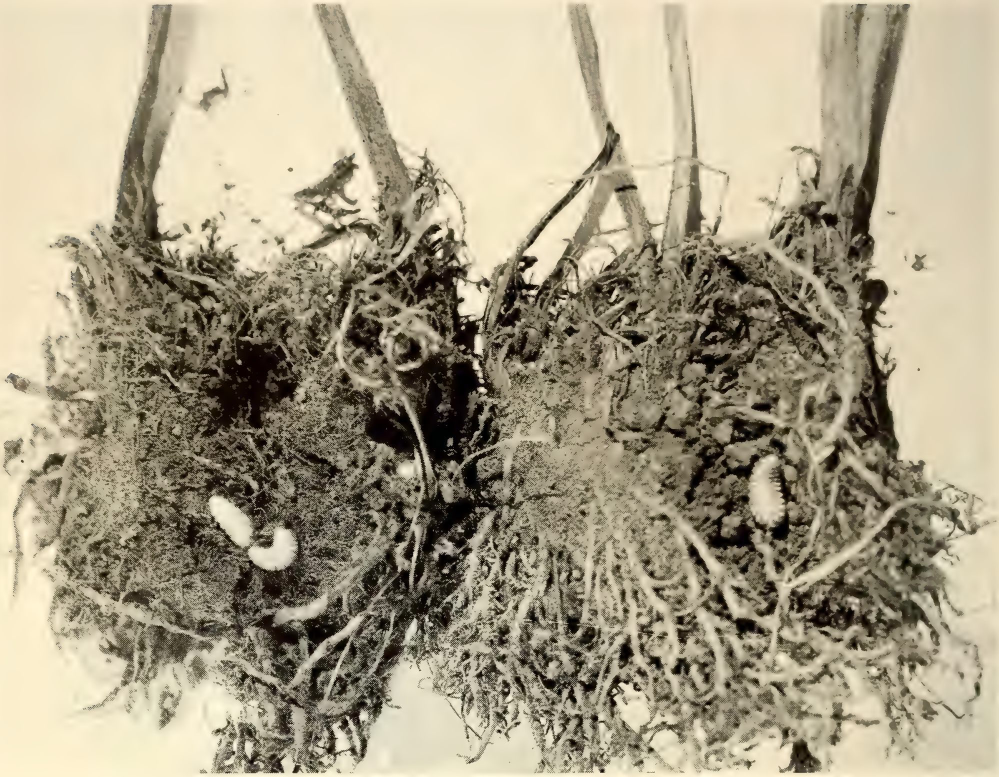
FOREIGN COUNTRIES LONG PROTECTED

For some 30 or 40 years prior to 1912, when there was no authority in law to control plant importations into the United States, the more important exporting European nations which were finding free markets in this country for their plant products—wiser than we—to protect their own cultures, were prohibiting



THE WORK OF THE EUROPEAN CORN-BORER IN AN EAR OF FLINT CORN

This European pest was brought to the United States in 1908 or 1909 with importations of broom-corn, and gained footholds near Boston and in western New York and also in southern Ontario (see preceding page).



SOIL ABOUT PLANT ROOTS A COMMON MEANS OF ENTRY OF PESTS

Moist earth such as comes about many plants has been the source of entry of a host of our worst plant enemies, such as the Japanese beetle, the alfalfa weevil, and many others. No method of disinfecting such earth with poisons is possible without killing the plants. Moist earth is one of the best "gas masks," and many lives undoubtedly could have been saved in France if the soldiers, before the gas masks had been devised, had filled their handkerchiefs with moist soil and breathed through these at times of danger.

The photograph is of Japanese iris roots, and in the surrounding soil are the grubs of a pest unknown in the United States, related to the Japanese beetle. Needless to say, this entire shipment was destroyed.

entry of living plants from the United States. These prohibitions, first based on the grape phylloxera and later more widely extended on account of the San José scale, were usually absolute and therefore much more drastic than the ones now enforced under our own quarantine law.

For example, no living plants from America have for many years been permitted to enter France, Germany, or Holland, while similar or modified restrictions have been long enforced by other European countries.

A PROTECTIVE LAW FOR THE UNITED STATES

The need for national quarantine legislation for the protection of the farm, garden, and forest interests of this country from further invasions by foreign pests was long appreciated, but the securing of this legislation necessitated an extended period of earnest effort.

Toward the end of this period this legislation was hastened by the increasing numbers of gipsy and brown-tail moths found during the years 1909-12 on imported plants, and also by many other insects and plant diseases and by the need, which began to be generally appreciated, of excluding such other important pests as the Mediterranean fruit fly, the potato wart, and the white pine blister rust.

The movement was aided also by the experience with the chestnut blight and the San José scale. The entry of the citrus canker, the Japanese beetle, and

PROTECTING CUCURBITS FROM ATTACK BY MELON FLIES

No effective control of this pest is possible except to enclose the young fruits in a paper sack immediately after the bloom has been fertilized. The illustration shows this method as employed by Oriental market gardeners in Hawaii.

the European corn-borer all occurred during the last years of the effort to secure this legislation and before it was actually enacted, although the fact of the entry and establishment of these pests was not determined until several years later.

The Plant Quarantine Act of 1912 was the final outcome of this 14-year effort to secure authority to protect the United States, so far as possible, from further entry of plant pests. In connection with broad quarantine and regulatory powers, this act makes specific provision for the regulation of the entry of nursery stock and other plants.

ADEQUATE CONTROL BY INSPECTION AND CERTIFICATION PROVES IMPOSSIBLE

During the first seven years of the enforcement of the act an effort was made to prevent the entry of new plant pests by relying as safeguards on foreign inspection and certification. These were made in the countries of export by the most expert officials available, and as an additional safeguard provision was made for reinspection of these importations at destination in this country, either by Federal or by State inspectors. This reinspection has given us a fairly just appreciation of the continuing risk with the entry of such inspected and certified plants.

It is true that under this system, in which the best skill both abroad and at home was employed, much improvement was made in the health status of the imported plants, and infection was undoubtedly reduced to probably as near a minimum as is humanly possible.

The record, however, of the seven years of interceptions of plant pests in connection with imported plants indicates very clearly that in spite of these safeguards numbers of injurious insects and plant

LIVING WOOD-BORING WORMS IMPORTED AS "MEDICINE"

The plant quarantine service of the Department of Agriculture calls into coöperation many other departments of the government, such as the Post-Office, State, and Treasury Departments, etc. The larva shown in this photograph was one of a shipment from Japan invoiced as "medicine" and intercepted and turned over to the Federal inspectors by the postmaster at San Francisco.

diseases were being brought to the United States every year and with almost every considerable importation of plants.

These records are, furthermore, by no means complete, inasmuch as many of the States were unable to inspect all of the shipments at destination and, furthermore, no inspection, however expert, can be relied upon to discover and eliminate all instances of infestation or contagion.

Inasmuch as it has been urged that adequate inspection abroad would eliminate these dangers, it is, perhaps, opportune to introduce at this time a summary of the plant pests intercepted on such importations from the principal exporting countries of the world during these seven years.

INJURIOUS INSECTS INTERCEPTED IN RECENT YEARS

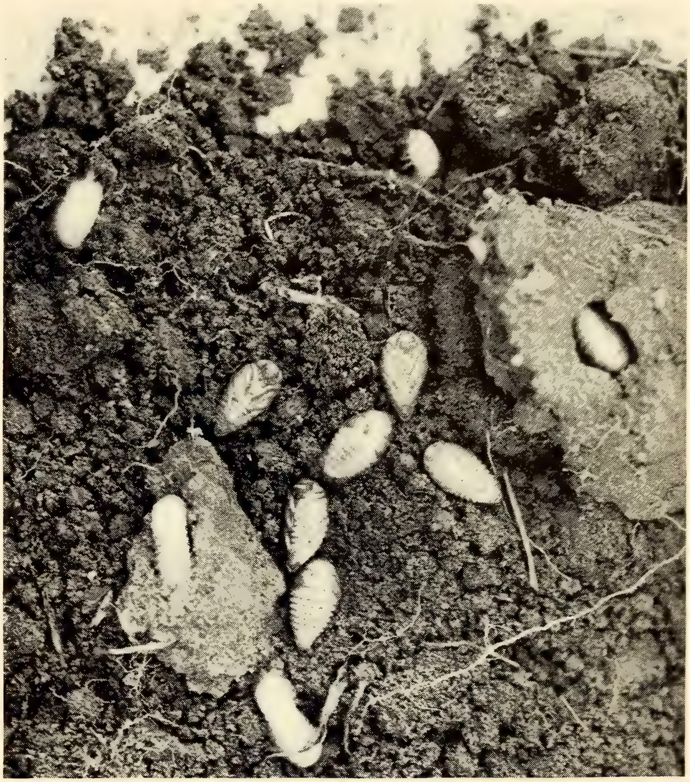
The countries made the subject of these records are those having the best and most expert inspection service and from which the plants coming to us have been in the best condition as to freedom from pests and general sanitation.

During this seven-year period, 1912-1919, there were received from Holland 1,051 infested shipments, involving 148 kinds of insect pests; from Belgium 1,306 infested shipments, involving 64 kinds of insects; from France 347 infested shipments, involving 89 kinds of insects; from England 154 infested shipments, involving 62 kinds of insects; from Japan 291 infested shipments, involving 108 kinds of insects. and from Germany 12 infested shipments, involving 15 kinds of insect pests.

As already indicated, these records are by no means necessarily complete, and, furthermore, in the instance of the State of New York, which receives the bulk of the foreign plant shipments, reports were made to the Department of Agriculture only of the most important findings. Many of these intercepted insects are not now known to be established anywhere in this country, and numbers of them, if established, would become important farm, garden, or forest pests.

Discussing briefly some of these interceptions, the European tussock moth, *Notolophus antigua,* an injurious forest and ornamental plant insect, was found in connection with no less than 67 different shipments of plants from Holland, involving some 16 different kinds of ornamental plants. Such important and easily detected pests as the gipsy and browntail moths were found respectively, in the egg and larval stages on no less than 63 different shipments of plants. These are merely typical illustrations out of many which could be afforded.

Practically all of these injurious insects which have been thus intercepted have been carried by the aërial portions of the plants and include few, if any, of the often more dangerous species hibernating in the soil about plants imported in balls of earth or in pots. It is not possible, without the destruction of the plants, to disintegrate and make an adequate examination of such soil, and no disinfection of such soil has proven possible without killing the plants.



THE JAPANESE BEETLE BREEDS IN THE SOIL

A spadeful of soil taken in a New Jersey meadow in the infested district is illustrated above. The eggs of the Japanese beetle are placed in the soil in pasture and other uncultivated lands during the summer, and the insect develops as a white grub, and later transforms into a pupa or chrysalis, and eventually into the mature beetle. The only method of reaching the weevil in the soil is by soaking it with powerful poisons—a very expensive and not altogether effective treatment.

PLANT DISEASES INTERCEPTED SINCE 1912

There is risk of entry through the medium of soil of a vast number of insects which, as elsewhere indicated, may have no relation to the plants imported, but may become important enemies of various field crops. The possibilities of such introductions of insects with soil are very large and are not theoretical, as indicated by the examples of such importations already given.

It is even more difficult to exclude plant diseases than it is insect pests, and in the case of many such diseases inspection is very often a safeguard of little importance. Many of these diseases are not discoverable by inspection or may develop to a visible stage only after a period of months or even years after the plants have been imported.

The pine blister rust, for example, cannot be determined often for five or six years, and other similar diseases may be in the tissues of the host plants and remain undiscoverable by any technical method except by planting and growth for a long period in quarantine.

With respect to the risk of introduction of dangerous diseases from Europe, it is significant that of the three serious diseases of forest trees that have been introduced into this country in recent years, two of them—the white pine blister rust and the European poplar canker—have come from Europe, where both of these diseases are well known, and in spite of the protection of European inspection service. The chestnut blight and the citrus canker similarly came from Japan, but in the case of these diseases no recognition of them had been made prior to their gaining foothold in this country.

INADEQUACY OF SPECIAL QUARANTINES

To prevent the entry of plant pests, quarantines and restrictions have been applied under the Plant Quarantine Act to all important dangers as they appear, and in this piecemeal fashion some twenty-two restrictive orders and quarantines are now in force against foreign plants and plant products. Such piecemeal action can be taken, however, only when the enemy is known, and gives no security against such unknown or unanticipated enemies as the San José scale, the Oriental peach moth, the Japanese beetle, the chestnut blight, and the citrus canker.

After having studied this subject, as indicated, for many years and after having given earnest consideration and a practical test of the possible alternatives of inspection and disinfection of plant imports, the experts of the Department of Agriculture and of the several States reached the conclusion that the only possible solution of this problem, which was constantly becoming more serious with the widening of commerce, is the policy of practical exclusion of all plant stock not absolutely essential to the horticultural, floricultural, and forestry needs of the United States. The existing control of plant importations is based on this principle. It is perfectly evident that no other system will give adequate protection to the great plant interests of this country.

ANY NEEDED PLANTS MAY BE IMPORTED

Ample provision has been made for the importation into the United States of any plant whatsoever, whether for introduction, experimentation, scientific, or other purpose.

In other words, no plants are absolutely denied entry into the United States under this or any other Federal quarantine, nor does the Department wish or intend now or at any time to make it impossible to secure new or old plants for which any reasonable introduction need can be indicated.

In addition to the provision in the quarantine for unlimited importation of certain classes of plants which are deemed essential to the horticulture and floriculture of this country, some 650 permits have been issued for the other, or so-called "prohibited, plants," for the purpose of establishing new plant-propagating enterprises which shall in a reasonable time supply our future needs.

Under these permits, entry has been authorized of upward of 16,000,000 of these so-called "prohibited plants," involving approximately 5,000 different kinds of plants. These importations are now being propagated and reproduced in hundreds of establishments in some 25 different States.

TRYING TO LESSEN RISK

It is the intention of the Department to continue to permit such entry of any necessary plant for the purpose indicated, to eliminate as soon as possible dependency on foreign countries, and thus attain the main purpose of the quarantine, in greatly lessening the risk of entry of new plant pests.

The existing restrictions on the entry of plants have been modified several times, and are subject to future modification upon presentation of adequate reasons therefor, and when such action can be taken without opening dangers which the quarantine is designed to guard against.

It would certainly seem to be good business and practical common sense to restrict as far as possible importations of plants which in the past have proven so disastrous to the agriculture and horticulture of this country. It is certainly unthinkable that the farm and garden and orchard and forestry interests of the United States or that any plant lover should want to return to the old system.

The plant life of America merits the same protection that is given to animals and man to ward off foreign scourges.

If the average American knew as much of plant diseases as he does of human and animal diseases, the necessity of a quarantine against infected plants would not need to be sustained by argument.

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OUR GREATEST NATIONAL MONUMENT*

The National Geographic Society Completes Its Explorations in the Valley of Ten Thousand Smokes

By Robert F. Griggs

Director of the Katmai Expeditions of the National Geographic Society

FROM the first accounts of the explosion of Katmai Volcano, in Alaska, in June, 1912, it was clear that it must rank among the dozen greatest historic eruptions. Nevertheless, these early narratives contained no accounts of the events of the eruption itself, but were confined to the description of its effects at great distances.

Closer inspection was not needed to establish the rank of the eruption, for it was evident that a cataclysm which buried towns a hundred miles away under a foot of ashes, whose concussions were so loud as to excite the comment of people at a distance of 750 miles, whose explosions threw such a quantity of dust into the upper atmosphere as seriously to diminish the intensity of sunlight for many months throughout the whole Northern Hemisphere, must have been among the greatest known to man.

Yet, tremendous as must have been the outbreak that produced such effects, it has gradually become certain, as the expeditions sent out by the National Geographic Society have explored the country round about, that the explosion of Katmai itself was by no means the most remarkable feature of this tremendous eruption.

It is too much to claim that the evisceration of Katmai was only a subordinate outbreak consequent upon the main disturbance, yet it is certain that before Katmai blew up another eruption, itself of the first magnitude, had already occurred at a distance of some miles from that volcano.

EXPLOSION OF KATMAI MERELY FINAL ACT IN THE ERUPTION

However the relative importance of the eruption giving rise to the Ten Thousand Smokes as compared with the explosion of Katmai may be judged, it is certain that the disturbance did not begin, as would naturally be supposed, with the big explosion. That was rather the closing act in the drama, the sequel to eruptions from the floors of valleys at a considerable distance from Katmai.

This is proven by the fact that the

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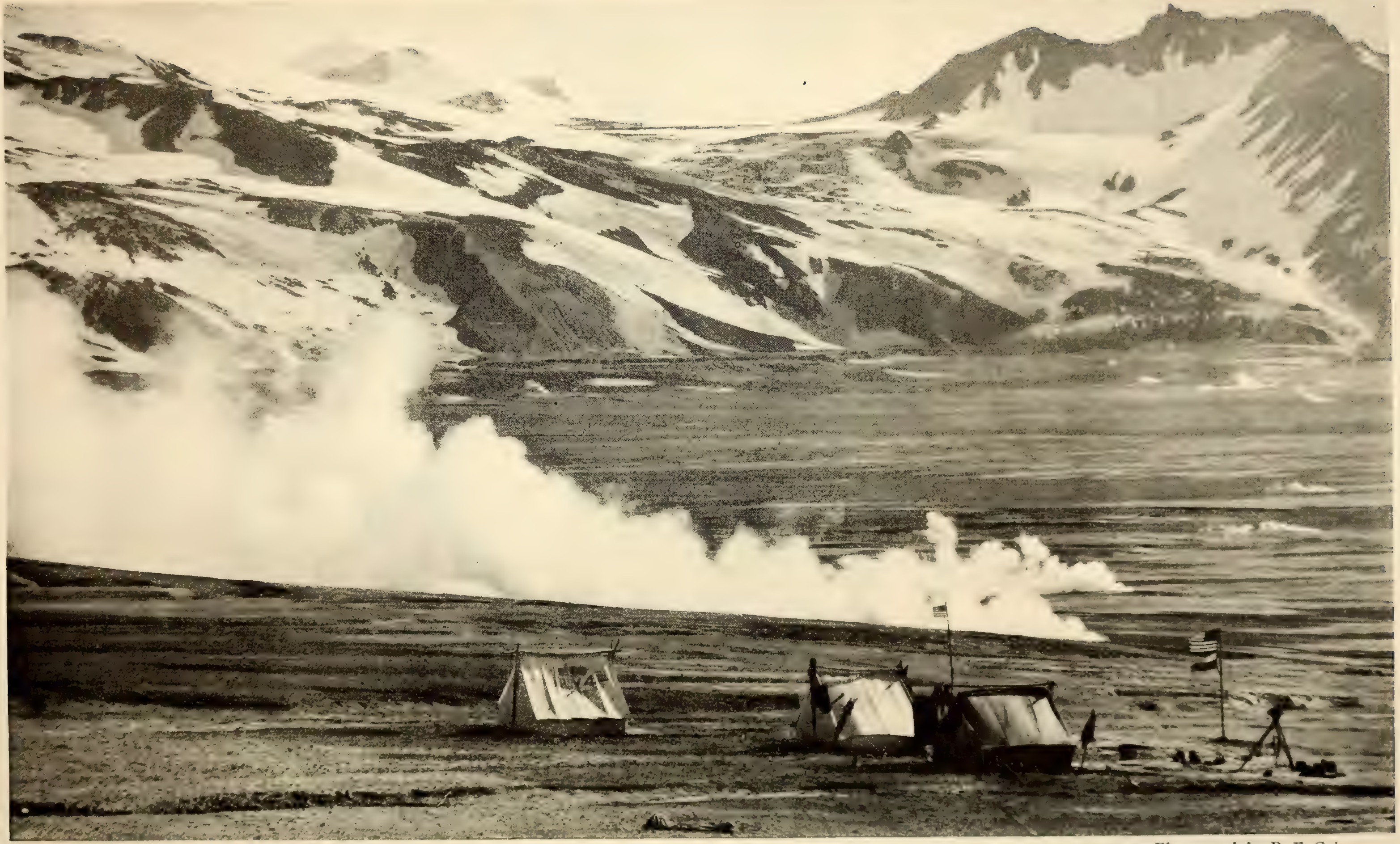
*Members of The Society will recall that the Valley of Ten Thousand Smokes was discovered by a National Geographic Expedition. The reports of The Society's six Katmai expeditions contain all the information that has been published covering the district. (See the NATIONAL GEOGRAPHIC MAGAZINE for January, 1917, and February, 1918.) These accounts gave such clear evidence of the unparalleled interest of the region that, by proclamation of the President of the United States, it was promptly added to our National Park System as the Katmai National Monument. (See NATIONAL GEOGRAPHIC MAGAZINE for April, 1919.)

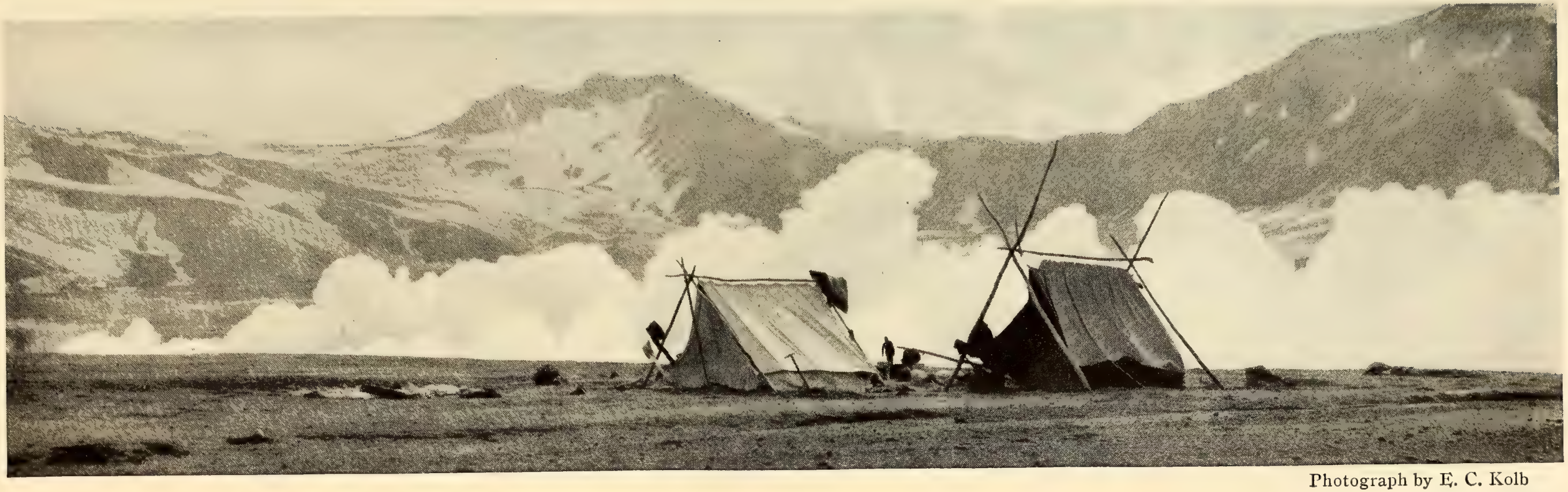
The only comprehensive account of the eruption was likewise prepared by a National Geographic Society Expedition and published in The Society's Magazine in February, 1913.



Photograph by R. F. Griggs

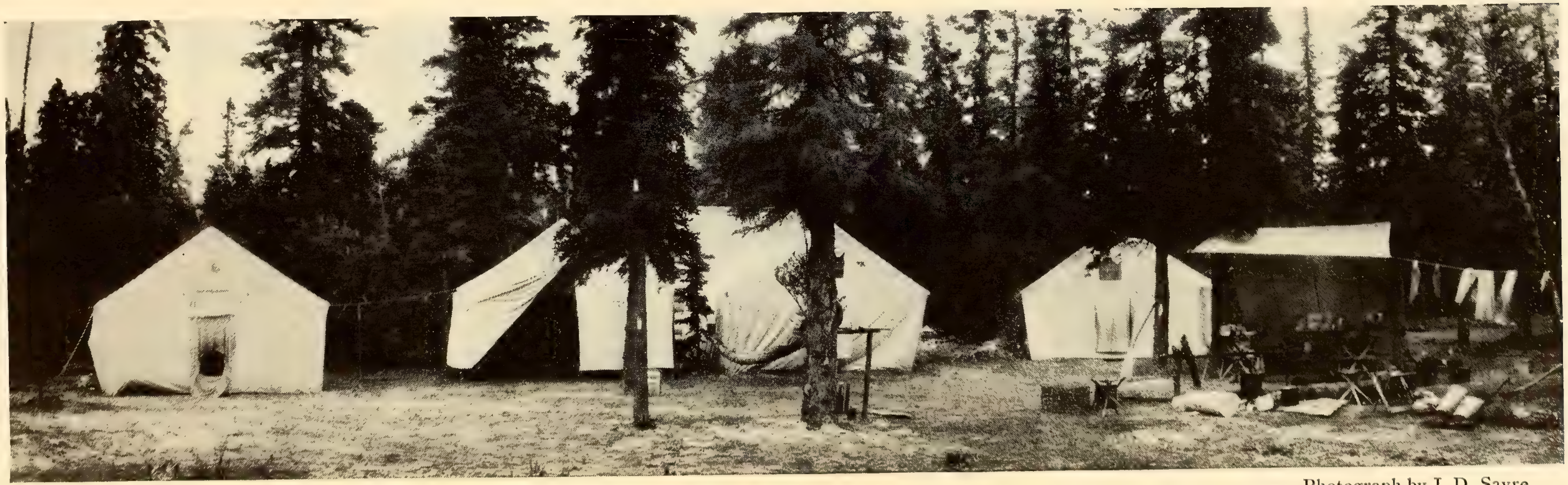
THE HEADQUARTERS OF THE NATIONAL GEOGRAPHIC SOCIETY'S LATEST KATMAI EXPEDITION DURING ITS STAY IN THE VALLEY OF TEN THOUSAND SMOKES

This is Baked Mountain Camp, with Mount Martin in the background. Before the eruption this was a green valley. Many travelers have camped beside a bunch of bushes that formerly stood near the middle of this picture, but at an elevation much lower than the present surface, for the valley was here filled many feet deep by the flow of incandescent sand (see page 241).



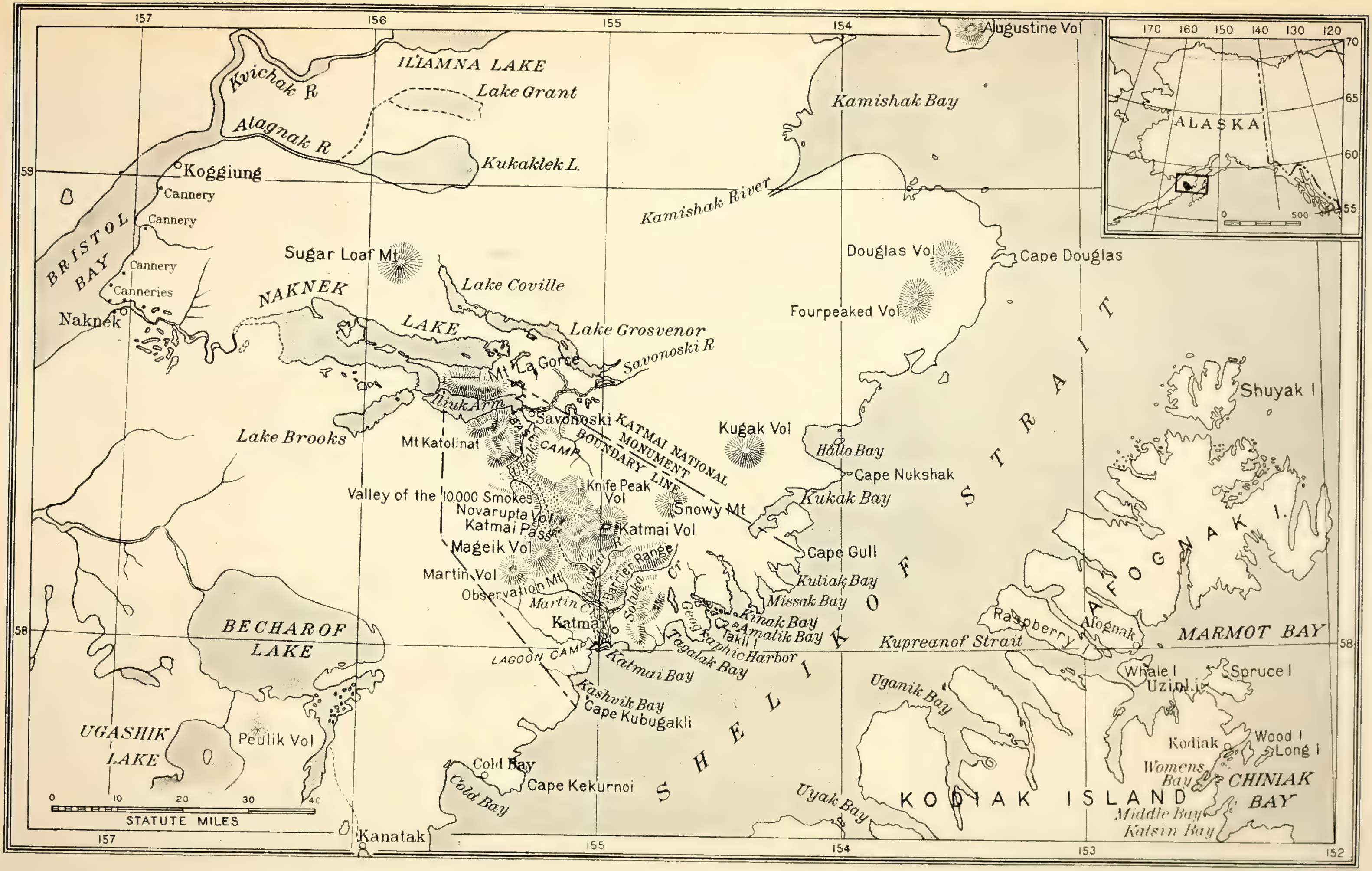
Photograph by E. C. Kolb

EVERYTHING FOR BAKED MOUNTAIN CAMP HAD TO BE LUGGED IN ON MAN-BACK FROM OUTSIDE THE BURNED AREA, A DOZEN MILES AWAY (SEE PAGE 228)



Photograph by J. D. Sayre

THE BASE CAMP IN THE FOREST AT THE HEAD OF NAKNEK LAKE, WHERE, SUPPLIED BY POWER DORY, THE MEMBERS OF THE EXPEDITION WERE ABLE TO PROCURE "ALL THE LUXURIES OF CIVILIZATION" (SEE PAGE 243)



Drawn by A. H. Bumstead

A MAP OF THE BASE OF THE ALASKA PENINSULA, SHOWING THE MAJOR FEATURES OF THE KATMAI DISTRICT AND THE ADJOINING COUNTRY

The National Geographic Society's Katmai expeditions have surveyed more than 3,000 miles of hitherto unmapped country and, in addition to scientific studies of Katmai Volcano and the Valley of Ten Thousand Smokes, have added Geographic Harbor, Lakes Grosvenor, Coville, and Brooks and Mt. La Gorce to the map of North America (see text and illustrations, pages 286 to 292). The dotted area is the Valley of Ten Thousand Smokes. The territory covered in the large map is indicated by the small black rectangle shown in the inset map of Alaska.

stratified ash from Katmai everywhere lies on top of the deposits of this earlier phase of the eruption, showing, of course, that the latter had already been poured forth before Katmai blew up (see p. 224).

The discovery of the Ten Thousand Smokes, as described in THE GEOGRAPHIC, furnished the first suggestion that there were other phases of the eruption of greater interest than the explosion of Katmai; but any understanding of what really occurred in those days of early June, 1912, involved so much study that it has not been possible until now to give any clear idea of the real nature of the eruption, and even yet there is much that must be left to conjecture, although the general features stand out fairly clearly.

The task of interpreting the events of this great eruption has been much the more difficult because, so far as can be found, nothing resembling it closely has ever been recorded before.

Since there were no witnesses of the catastrophe, we are limited in framing our account of its events to deductions from the study of its effects on the surrounding country. Indeed, it is hardly probable that any observer would have survived to tell the tale if he had been near enough to see what actually happened.

It will be understood, therefore, that our account must of necessity be made up of reasonable inferences and necessary conclusions from evidence left behind rather than of the narration of a series of observed events, and it must be read in this light.

A GREEN VALLEY SUDDENLY TRANSFORMED INTO A NEST OF VOLCANOES

Some time before the beginning of the terrific explosions whose sounds first announced to the world that an eruption was in progress, a host of small volcanoes burst open in the floor of the green valley through which ran the Katmai Trail. The date is unknown, but was probably near to the first of June, 1912 (see page 271).

In the very formation of these vents, the eruption presented a feature unusual in volcanic phenomena; for this was no reawakening of dormant vents, such as constitutes the vast majority of eruptions, but rather the formation of new volcanoes in areas where none had existed previously. If there had been nothing else remarkable about the eruption, this alone would have set it off as a noteworthy event.

These new volcanoes consisted simply of holes blown through the floor of the valley, not of hills or mountains with craters at their tops. How many of them there were or how they may have looked and acted when they first burst open, we have no means of knowing, but there is reason to believe that they constituted literally a host in number, and that they consisted at first merely of lines of crateriform holes blown through the floor of the valley, resembling, perhaps, the close-set shell-holes of a battlefield, though, of course, much larger than the craters produced by the explosion of even the biggest shells. Whatever their original appearance, it is certain that soon after their formation they began to throw out ash and pumice in enormous quantities.

A SPECTACLE THAT PASSES THE POWERS OF THE IMAGINATION

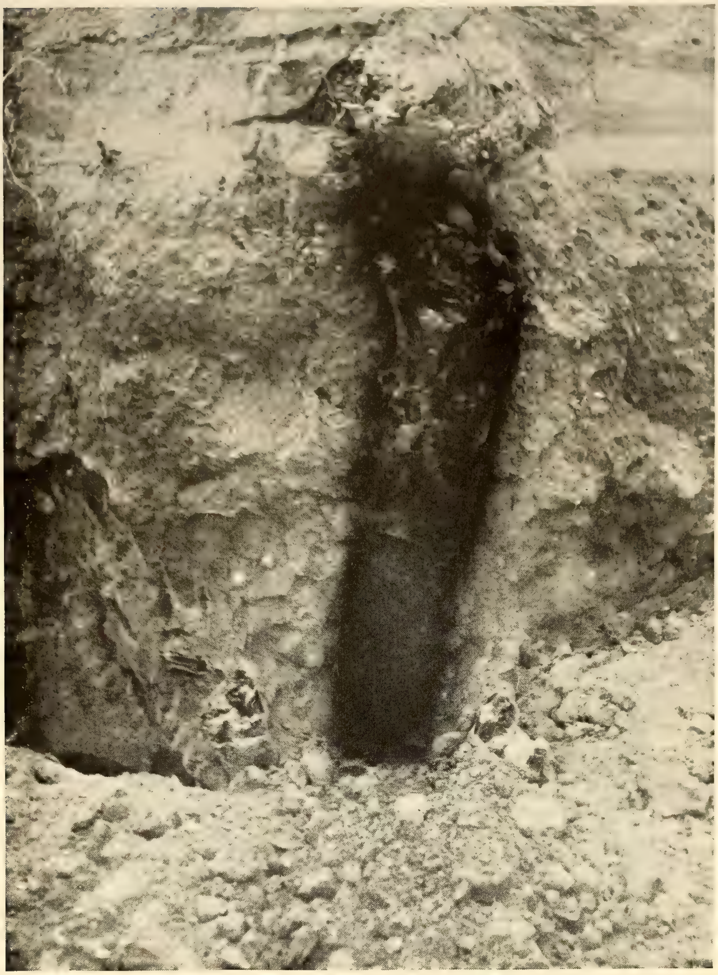
The Ten Thousand Smokes, wonderful as they are at their best, can give no idea of what the valley must have looked like in this initial stage. In addition to myriads of fumaroles, probably greater than any that now remain, scores or hundreds of vents must have been belching forth incandescent material in veritable torrents of fire.

Prodigious quantities of red-hot solids and liquids, sand and stone, masses of fluid or semifluid lava, issued from the vents and poured out on the ground, following the slope in rolling, tumbling fiery torrents that consumed everything they touched.

In the first stage, if one could have seen it, many separate volcanoes would have appeared in different parts of the valley, each pouring forth its own contribution to the general chaos.

From each there was probably a great black cloud rising to a considerable height in innumerable, ever-expanding, lobulated convolutions. From analogy with other eruptions, we may suppose that electrical displays of weird grandeur accompanied the clouds rising from the various vents.

On careful observation it would have



Photograph by L. G. Folsom

PROOF THAT THE VALLEY OF TEN THOUSAND SMOKES OPENED BEFORE KATMAI BLEW UP

Beneath the three layers of ash from Katmai is seen the massive sand-flow, which must already have run its course before the ash began to fall. This picture was taken close to the terminus of the sand-flow. The charcoal log, a foot in diameter, is striking evidence of the heat still retained by the sand 16 miles from the head of the flow at Novarupta (see page 229).

become evident that the source of the cloud was the mass of incandescent material around the vents. It was in fact produced by the gases that boiled out of the mushy semi-molten lava. The quantity of gas given off was so great that the whole mass of lava was puffed up into frothy pumice and entirely disrupted into small fragments by the expansive force of the escaping gas.

If any other of a score of valleys in the vicinity had been the seat of the disturbance, it would probably be impossible to gain any information of its character before the eruption, for the whole country roundabout was an unexplored wilderness; but, as it happened, the eruption occurred in the one valley of the district about which something was known; for this particular valley was the route by which a well-known trail crossed the Alaska Peninsula from the Pacific to the Bering Sea.

For ages past this trail had been an inter-tribal highway between Katmai Village, on the Pacific, and Sabanoski, at the head of Naknek Lake, whence passage downstream to the Bering Sea was an easy matter. More recently it was much used by both Russians and Americans, so that there are many men still alive who traversed the valley and camped within its confines before the eruption (see p. 220).

It is certain that none of these travelers, among whom was at least one able geologist, ever suspected that this peaceful valley might become the theater of such an eruption.

There was no indication of volcanism outside the chain of old volcanoes forming the axis of the peninsula, and these had not been active for ages past, except for occasional smoking.

The valley was overgrown, up to an altitude of nearly 1,500 feet, by a dense forest of spruce, poplar, and birch, broken only by ponds and tundras in the low places. Above the timber-line there was still abundant tundra vegetation, with occasional clumps of bushes close up under the volcanoes themselves.

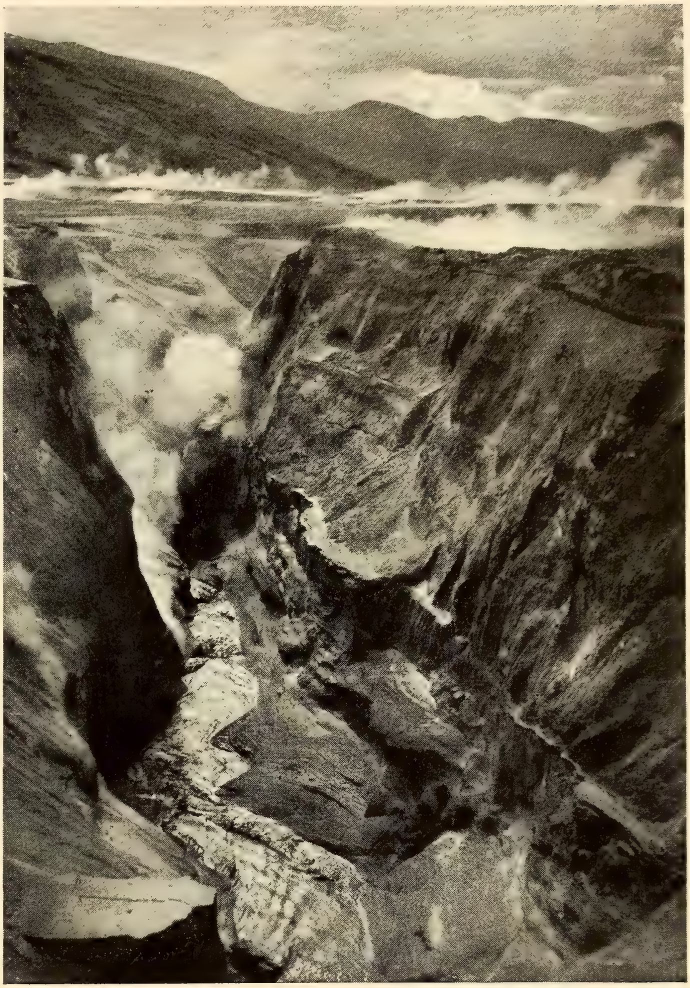
Except for the ancient lava flows poured out at the head of the valley from these old volcanoes in prehistoric times, the rocks of the valley are not volcanic, nor even igneous. They consist rather of horizontal sedimentary strata, of sandstone and shale, full of fossils of marine shellfish of Jurassic age.

While a geologist might have predicted an early eruption from Katmai or from Mageik, the possibility of such a cataclysm as broke loose in the floor of the valley would never have occurred to him.

STORY OF THE ONLY EYEWITNESS

Although the pass was frequently crossed by travelers, there was no permanent settlement in the valley. About halfway up, however, was a group of native huts known by the name of Ukak. These seem to have constituted a sort of hunting lodge, used by the natives of the village of Savonoski, for the valley was formerly the abode of abundant herds of caribou, as well as moose, bear, and fur-bearing animals.

Warned by preliminary disturbances, of whose character no clear account is given, beyond the statement that there were frequent earthquakes, "American Pete," chief of the Savonoski natives, had gone to Ukak to remove his gear and was on the trail when the eruption occurred. He was thus the only human being who had any opportunity of observing what happened in the valley.



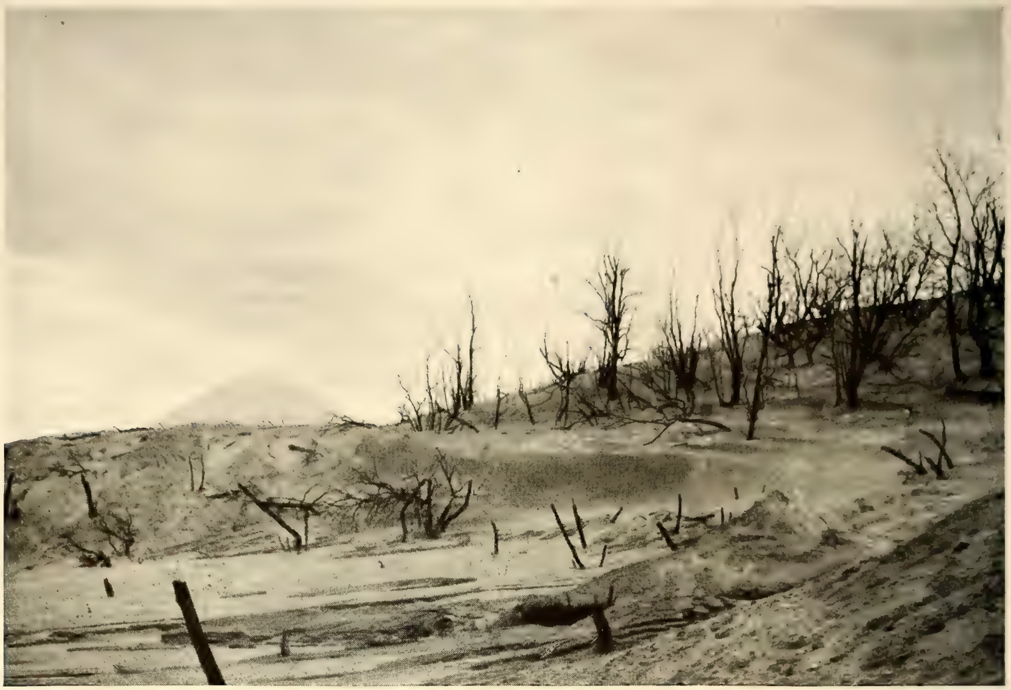
Photograph by Frank I. Jones

KNIFE CREEK CANYON

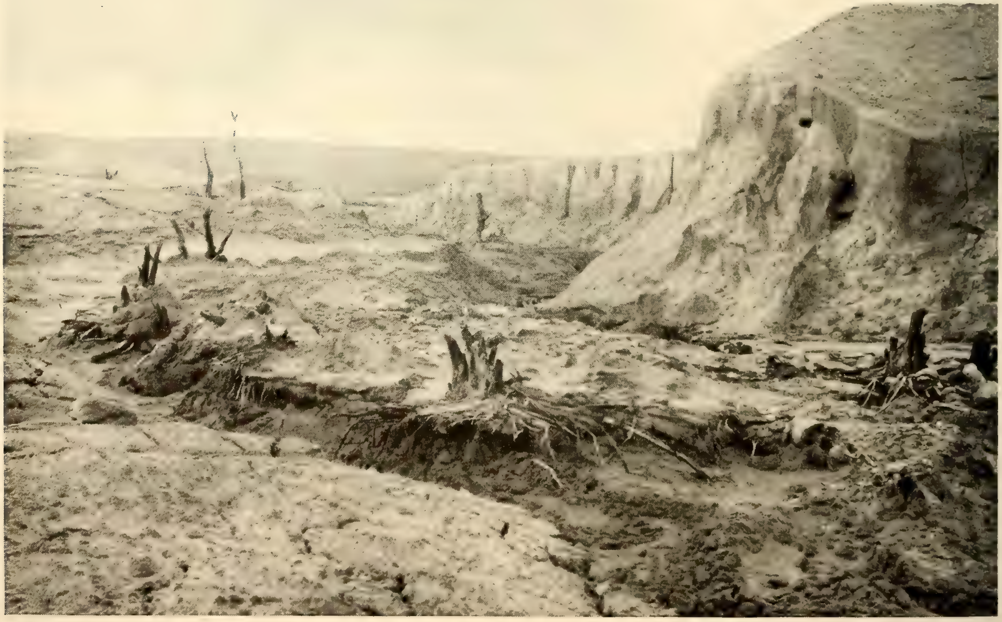
The streams have cut most curious sinuous canyons into the stiffened mass of the sand-flow. Although in places these canyons are a hundred feet deep, they do not cut through the flow to the soil beneath, except in the lower part of the valley.

This fact gives an unusual interest to his story, since, meager as it is, it constitutes the only scrap of direct evidence concerning the beginning of the Ten Thousand Smokes that can ever be secured. He was interviewed by Mr. P. R. Hagelbarger, of the 1918 Expedition. At that time he was an old man, in the last stages of tuberculosis, and it was difficult to get him to talk freely.

"The Katmai Mountain blow up with lots of fire, and fire come down trail from Katmai with lots of smoke," he said. "Me go fast Sabanoski. Everybody get in bidarka [skin boat]. Helluva job! We



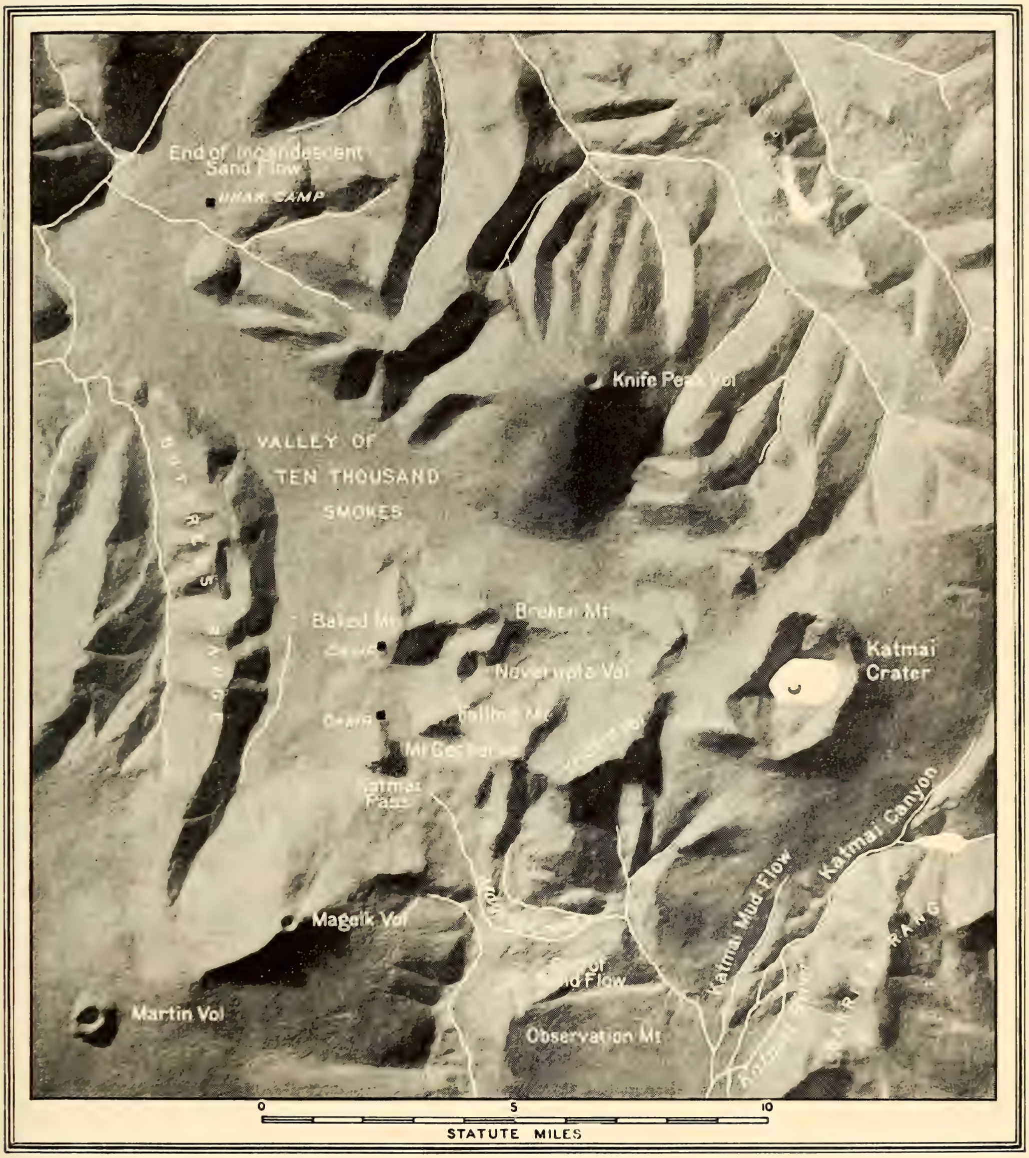
THE EDGE OF THE CHARCOAL FOREST ABUTTING UNINJURED TREES ABOVE THE EDGE OF THE ONCE FIERY TORRENT (SEE PAGE 229)



Photographs by R. F. Griggs

STUMPS OF TREES BURNED OFF BY THE HOT SAND-FLOW; EXPOSED BY EROSION

Near the terminus of the flow, where this picture was taken, the sand had so far cooled as not to burn the trees clear to the ground.



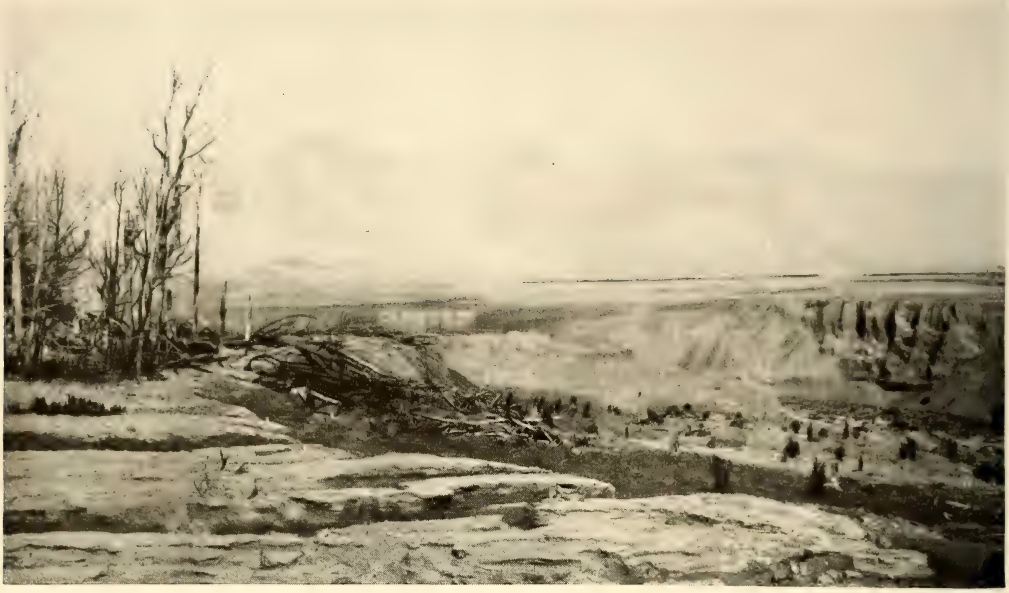
Photograph from a model by A. H. Bumstead

A MODEL OF THE VALLEY OF TEN THOUSAND SMOKES AND THE VICINITY

The illustration shows the old volcanoes, the character of the incandescent sand-flow, and the base camps of The Society's parties. The fumaroles are omitted. Sculptured by A. H. Bumstead from a survey by the National Geographic Society's Katmai expeditions.

come Naknek one day; dark; no could see. Hot ash fall. Work like hell. Now I go back every year one month, maybe, after fish all dry, and kill bear. Too bad! Never can go back to Sabanoski to libe again. Everything ash. Good place, too, you bet! Fine trees, lots moose, bear, and deer; lots of fish in front of barabara [house]. No many mosquitoes! Fine church. Fine house. Naknek no good."

Realizing the importance of the testimony of this man, Mr. Hagelbarger endeavored by questioning to elicit further details, but none were to be obtained. He and his associates were too badly frightened and too much concerned with "fleeing from the wrath to come" to make any detailed observations. He must have left Ukak before the eruption was fairly under way. Indeed, it is probable that



Photograph by P. R. Hagelbarger

THE EDGE OF THE HOT SAND-FLOW

The lower ground, exposed in the drainage gulley, was originally covered with forest like the bank on the left. Here and there a burned stump remains to show what happened when it was overflowed by the hot sand. The destruction shown in the right half of the picture is complete and total (see page 229).

he could not have escaped if he had been a little later.

Ordinarily stories of "fire" in connection with eruptions are to be discounted, for it is generally the flow of molten lava rather than the flame of combustion that has been seen. But in this case Pete's statement that "fire come down trail from Katmai" is literally true; for the red-hot ash and pumice thrown out on the ground started fires of such intensity that they swept over the adjoining mountain sides, consuming every vestige of vegetation throughout the area surrounding the upper valley.

So completely were the plants destroyed in this area that there remains today not a scrap of charred wood or other evidence to indicate their former presence. Around the head of the valley all plants were completely consumed and their ashes long since scattered.

Along the far side of the valley, where the fires were somewhat less intense, the roots of the former abundant vegetation remain in the soil, but the fire made a clean sweep of everything above ground.

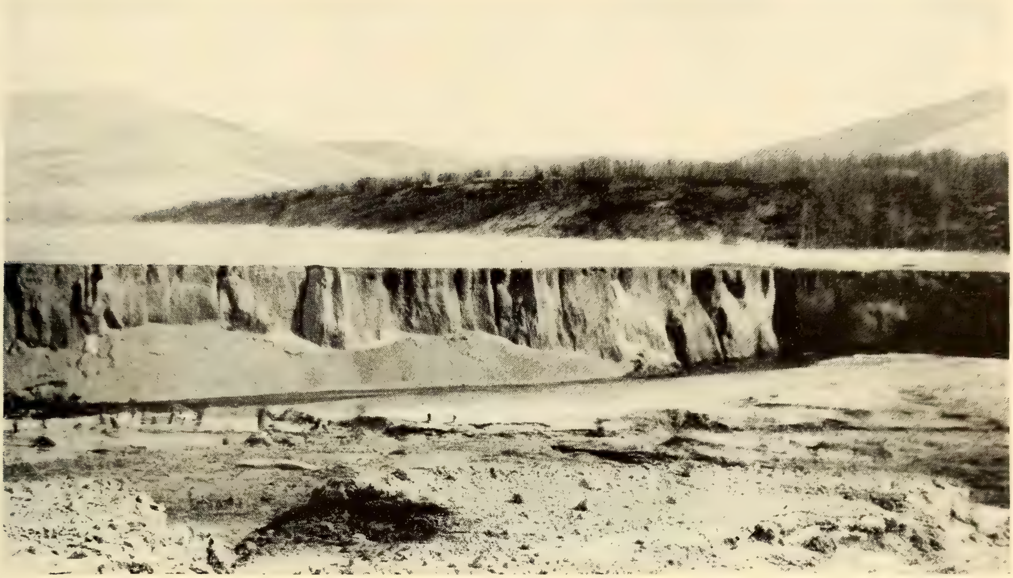
On account of the complete destruction of everything combustible, whatever we needed at our camps had to be carried in on man-back from outside the burned zone, a dozen miles away.

The ordinary outdoors man can hardly realize the barrenness of the valley as to everything which he expects to find anywhere. Every tent-pole and every walking-stick had to be lugged in from a distance, with the expenditure of no little time and energy. So simple a thing as providing stakes to mark the fumaroles under special observation required a very considerable amount of forethought and labor (see page 221).

If it had not been for Nature's fires, it would have been impossible for us to cook. It was, of course, out of the question to carry in fuel for any sort of a fire.

Long before the fires that consumed the surrounding vegetation had time to run their course, the masses of incandescent fragments accumulating round the separate vents coalesced until they covered the whole area of the valley, converting it into a single fiery torrent of seething, swirling masses of red-hot sand and rock, which soon began to roll down the valley under gravity.

Before it finally came to rest, this fiery



Photograph by P. R. Hagelbarger

LOOKING ACROSS THE SAND-FLOW NEAR ITS TERMINUS

This illustration is panoramic with the picture on the opposite page. The massive character of the flow and its relations to the undisturbed forest covering the hills beyond its reach are evident. The fiery torrent consumed everything it touched (see page 241).

torrent ran down the valley for about 17 miles. Even at that distance it was so hot that, although it no longer utterly consumed the forest nor started fires up the mountain sides beyond its reach, it still reduced every stick it touched to charcoal (see page 224).

The charcoal forests, uncovered where the streams have later cut into the substance of the cooled and stiffened flow, are extremely impressive witnesses of the fiery avalanche that overwhelmed them—far more striking than the utter barrenness of the upper valley, where the work of destruction was so complete as to leave the imagination powerless to reconstruct the original scene.

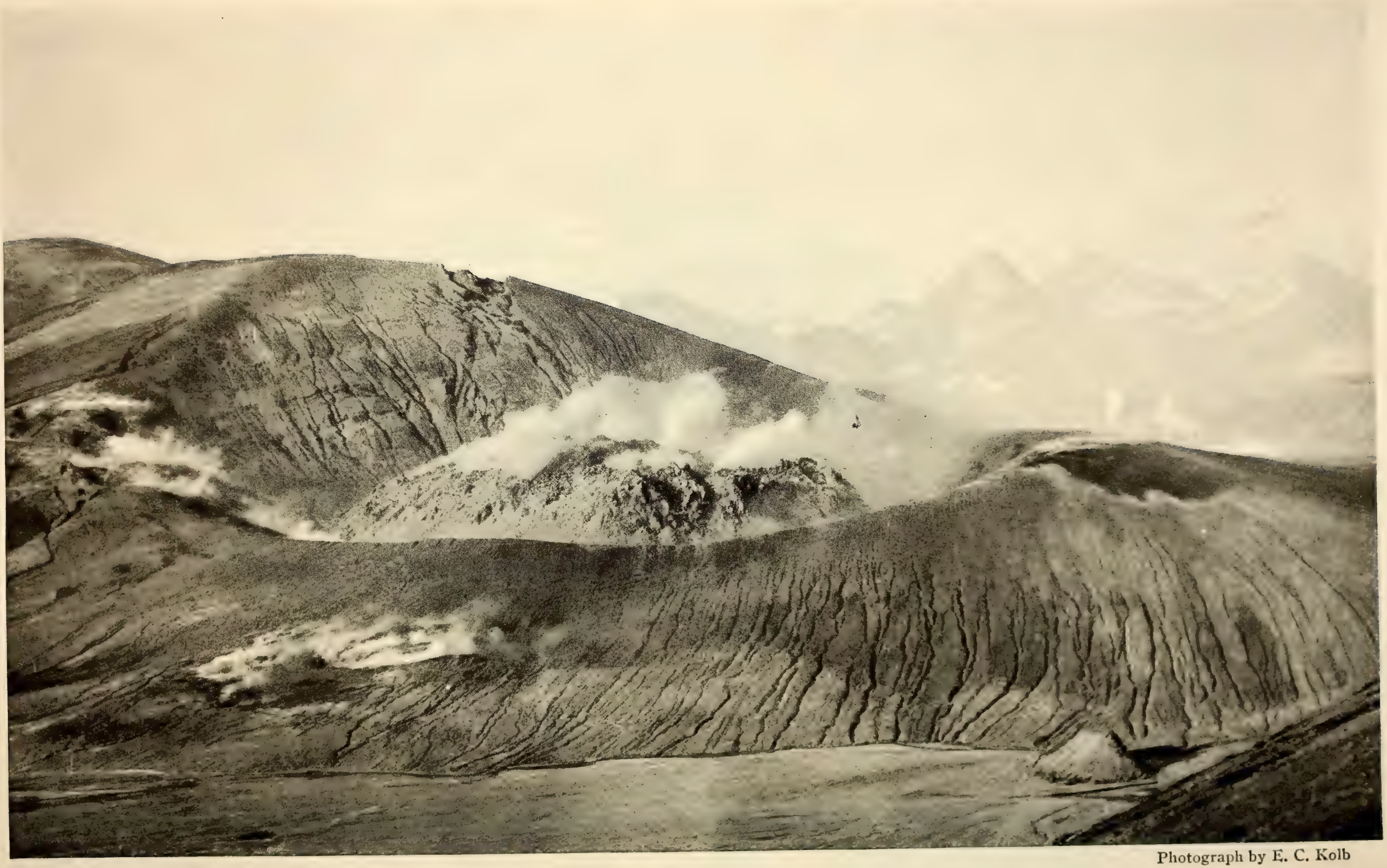
ESSENTIALLY DIFFERENT FROM A LAVA FLOW

In many places one can see the trunks of the overwhelmed trees standing where they grew, rooted in the ground, but turned to columns of black charcoal. Such charcoal logs are sometimes a foot in diameter. In other places the mat of vegetation that originally covered the ground is preserved as a conspicuous stratum of charcoal on top of the old soil (see pages 224 and 226).

Although the description will undoubtedly call to mind the condition of an ordinary lava flow, this fiery mass cannot be properly compared with a stream of molten lava, for it differed from a lava flow in many essential particulars. Although undoubtedly liquid in the beginning, it did not long remain so, for the escaping gases promptly converted it into a suspension of innumerable solid fragments buoyed up by the enormous quantities of gas which were being given off from within their substance.

The physical behavior of the resultant fluid was very different from molten lava, for lava under the most favorable circumstances is a viscous liquid, moving slowly, like stiff tar, whereas such a suspension may run like water.

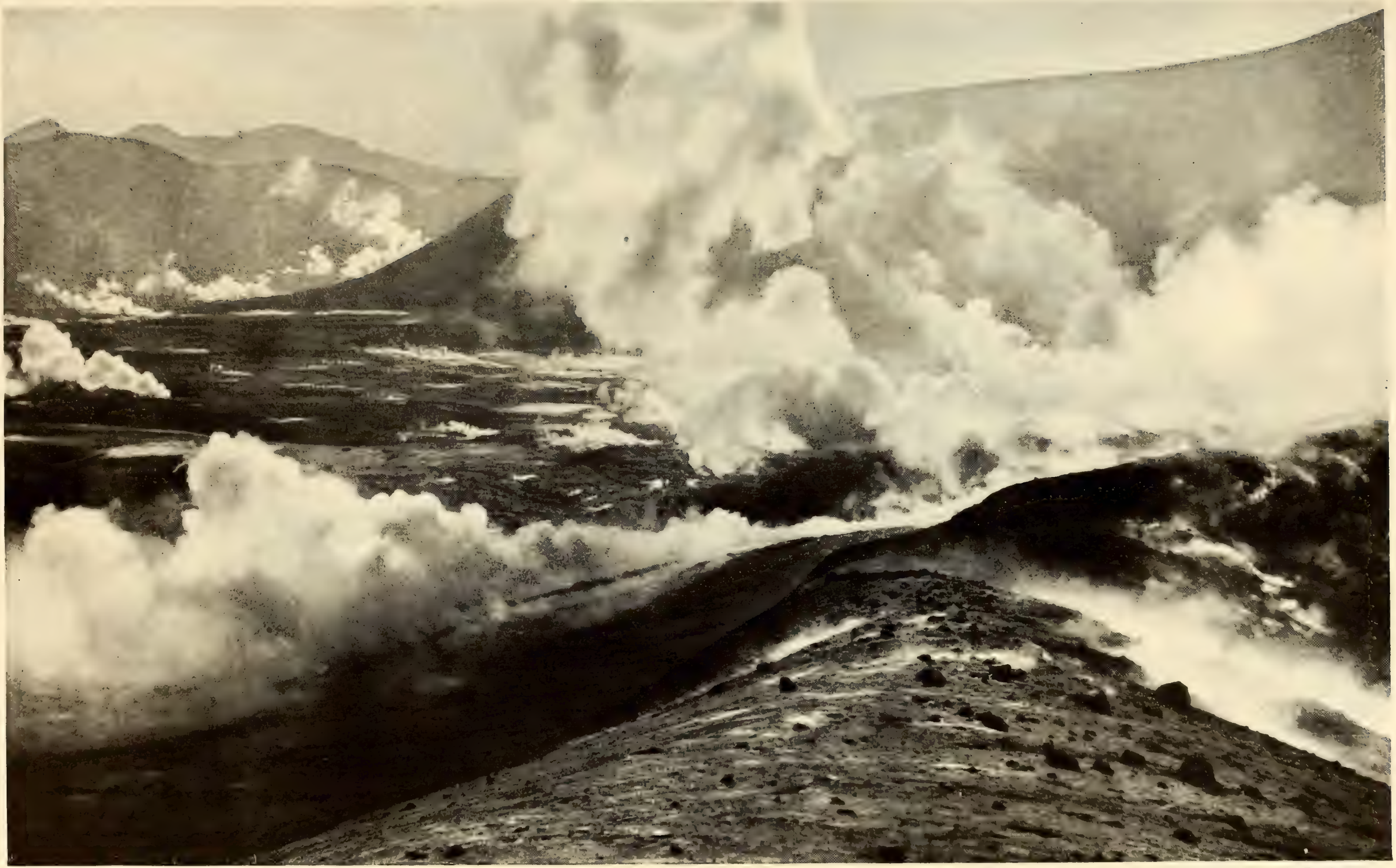
Had the quantity of gas been less, the material might have remained a liquid lava of the conventional kind and hardened into solid rock on cooling, but the heavier constituents were so completely disrupted that on cooling they became ash and pumice similar to that formed in the typical explosive eruption. When the flow came to rest and cooled down, therefore, it became a fine-grained friable tuff, easily cut into by running water, rather



Photograph by E. C. Kolb

NOVARUPTA FROM THE SLOPE OF FALLING MOUNTAIN

The central lava plug is surrounded by a ring of material thrown out in the explosive stage with which this volcano began its existence. It is probable that a considerable fraction of the incandescent sand came from this vent (see text, page 223).



Photograph by E. C. Kolb

LOOKING ACROSS A CORNER OF THE VALLEY OF TEN THOUSAND SMOKES FROM THE RIM OF NOVARUPTA

Novarupta appears to be the climax of the activity of the valley. There are many large and impressive fumaroles near by. It is a significant fact, however, that none of the extremely high temperatures have been found in this vicinity.

Photograph by L. G. Folsom

KOLB IN THE RÔLE OF SAMSON

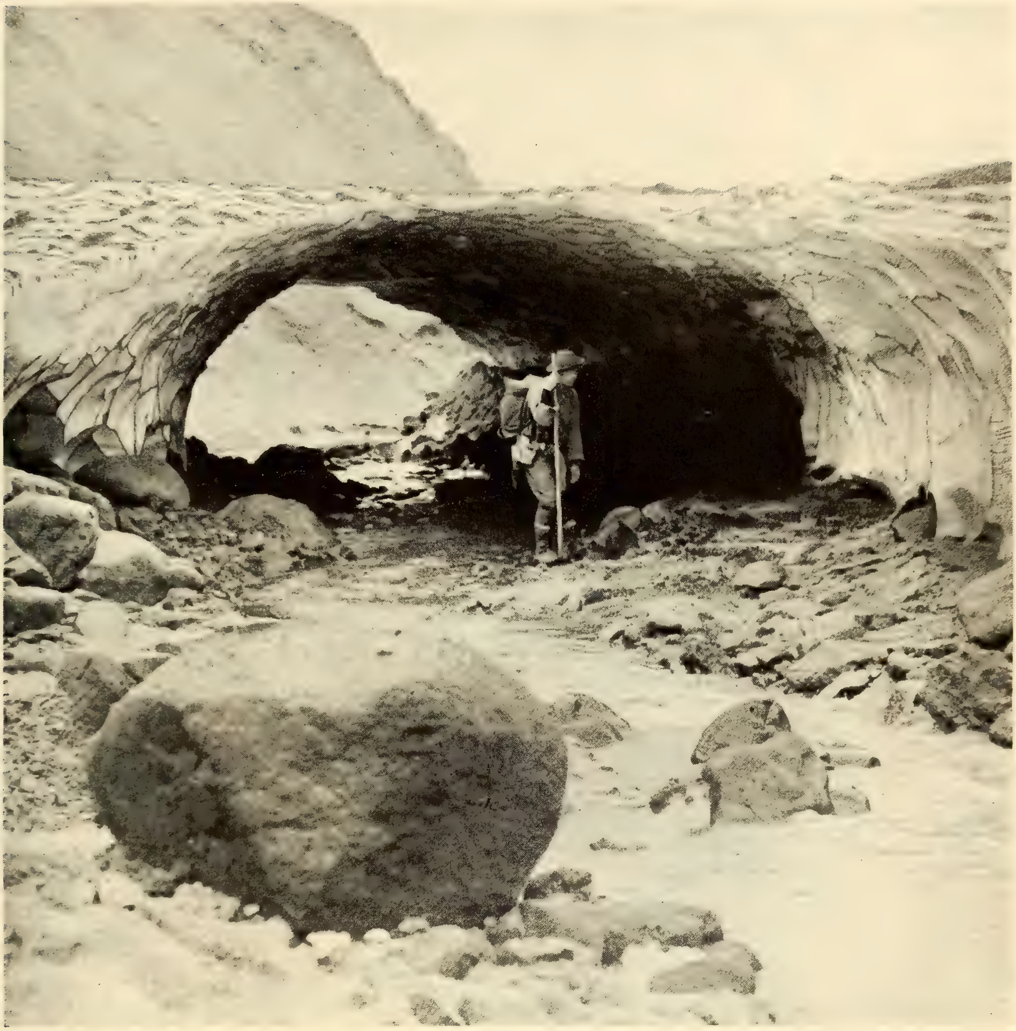
Balancing such a "rock" in the air is not so much of a feat as it appears, for the mass is a chunk of pumice blown so full of bubbles by the gases of the eruption that it might float on water. Such large pieces of pumice are confined to the vicinity of Novarupta. All the ejecta of Mount Katmai itself are very finely divided because of the greater violence of its explosion.

than the solid rock of a hardened lava flow (see page 225).

VALLEY SURROUNDED BY "HIGH-SAND MARK" OF THE FIERY TORRENT

One of the most conspicuous features of the valley as it stands today is the clear-cut margin of this great mass of once incandescent sand, which stretches in a practically continuous high-water mark all around its margin. The continuity of this "high-sand mark" shows clearly that the incandescent mass was not poured down one of the adjacent mountain sides into the valley, but must have originated from vents within its confines. This is clearly evidenced by many additional facts which cannot be detailed here (see page 220).

During the whole period of flow the mass was probably kept in a state of constant turmoil by the continued evolution



Photograph by Frank I. Jones

A STREAM FROM A HOT SPRING MADE THIS NATURAL BRIDGE OF SNOW

Hot water emerges from many openings in the valley leading up to Katmai Pass. These ancient hot springs were well known to the natives. They constituted almost the only sign of volcanic activity in the district before the eruption of 1912.

of gas from the substance of its solid components.

After the forward motion had ceased, explosions continued for a time, tearing great yawning holes in the surface of the smooth valley floor—the present craters which dot its surface. Some of these are isolated; others stretch out in long lines like beads on a string, indicating probably the seat of fundamental fractures in the rocks beneath. In other places they are so thickly peppered over the surface as to coalesce and form compound nests of craters. Two of these measure half a mile in diameter (see page 246).

The explosions responsible for the valley craters were insignificant in violence as compared with the great outbursts of Katmai, for all the debris fell in the immediate vicinity, no recognizable quantity having reached the sides of the adjacent mountains. Still, explosions capable of tearing up pieces of ground half a mile square and upheaving them in a series of fountains of red-hot rocks thrown in all directions would, from the human standpoint, form about as awe-inspiring an exhibition of titanic forces as can well be imagined.

The fiery flow at its height must indeed

Photograph by E. G. Zies

DROPPING THE THERMOCOUPLE INTO A DEEP HOLE

Photograph by Frank I. Jones

CHEMISTS PREPARING TO COLLECT THE GAS FROM ONE OF THE FUMAROLES

A complete knowledge of the gases given off by the fumaroles could not fail to add greatly to our understanding of the problems of volcanism.

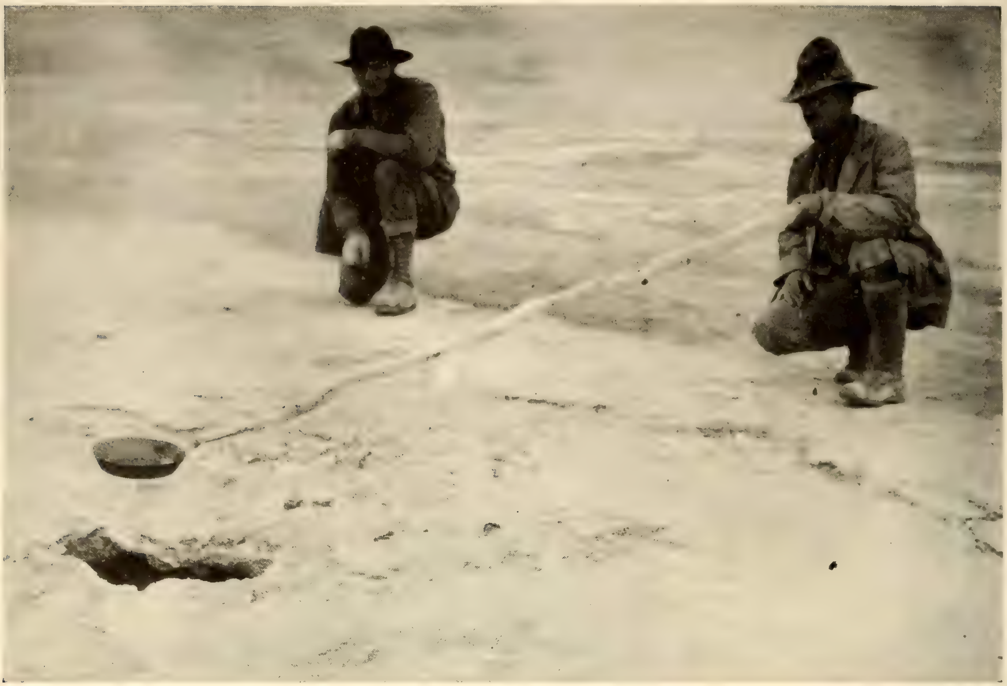
Photograph by R. F. Griggs

APPROACHING ONE OF THE BIG FUMAROLES

Photograph by E. G. Zies

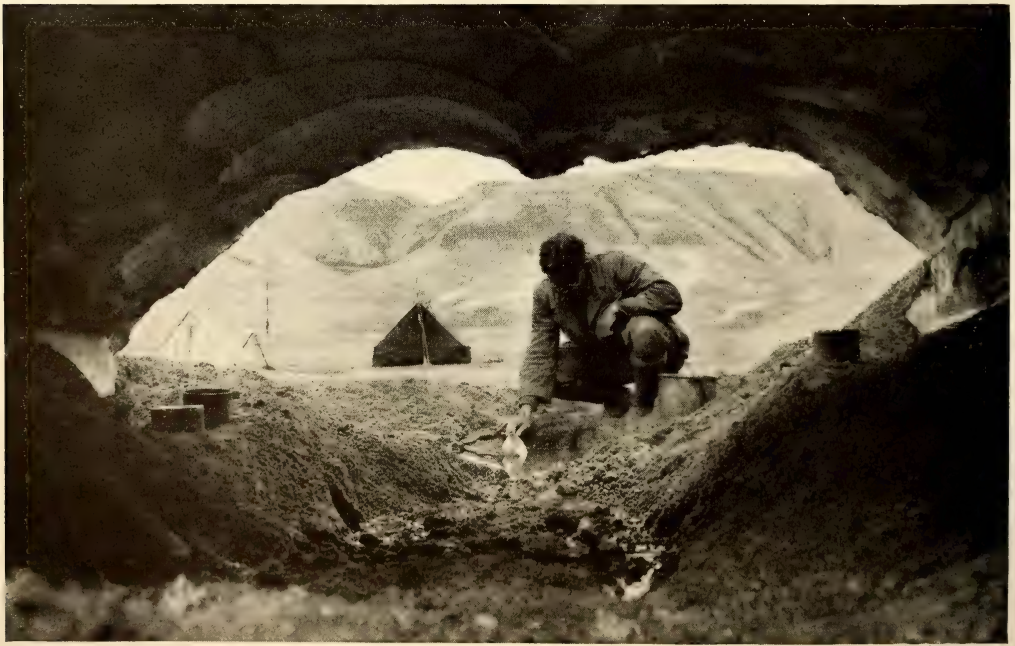
STEAM RISING FROM HOT SPRINGS IN THE LOWER END OF THE VALLEY

These streams were running cold in 1917 and 1918. At that time the hot springs of 1919 were fumaroles, whose steam escaped into the air without warming the surface waters.



FRYING BACON OVER A FUMAROLE

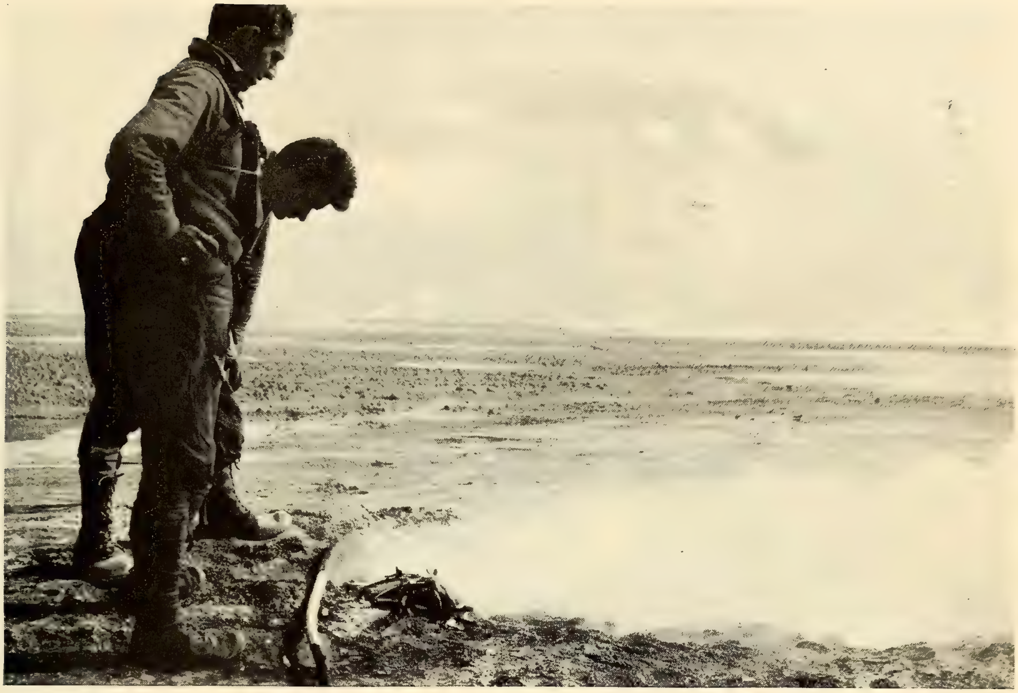
It is hard to appreciate the situation from a still picture. The steam is so hot and dry, as it rushes forth, that it is perfectly clear. The pressure was so great as to lift the frying-pan high in the air. It had to be held down against the outrushing steam (see page 262).



Photographs by E. C. Kolb

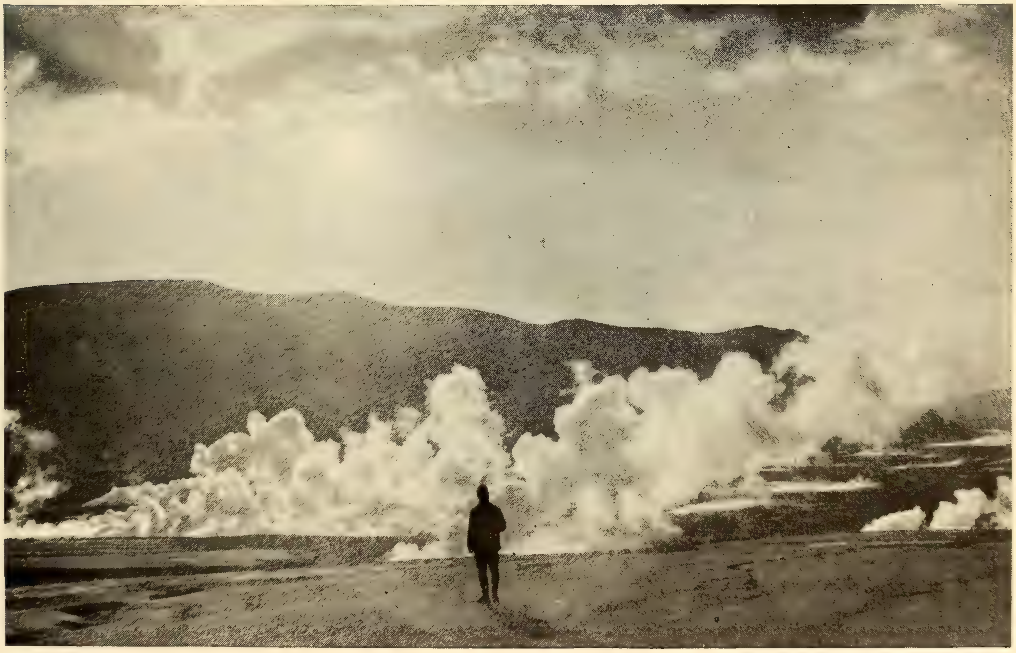
OUR DRINKING POOL AT THE MOUTH OF A SNOW CAVE

By moving the tents a few feet back or forward, we could obtain any desired floor temperature. Only a few rods beyond the tents was our cookstove.



A BONFIRE KINDLED BY WATER (SEE PAGE 250)

One of the fumaroles was so hot and dry that shavings burst into flame after being plunged for a moment into its hot vapor. Since this consisted of almost pure steam—that is to say, water—what we really did was to kindle a fire by poking a stick into the water. Temperature measurements by the geophysicists showed that it was 645° C. (nearly 1200° F.).

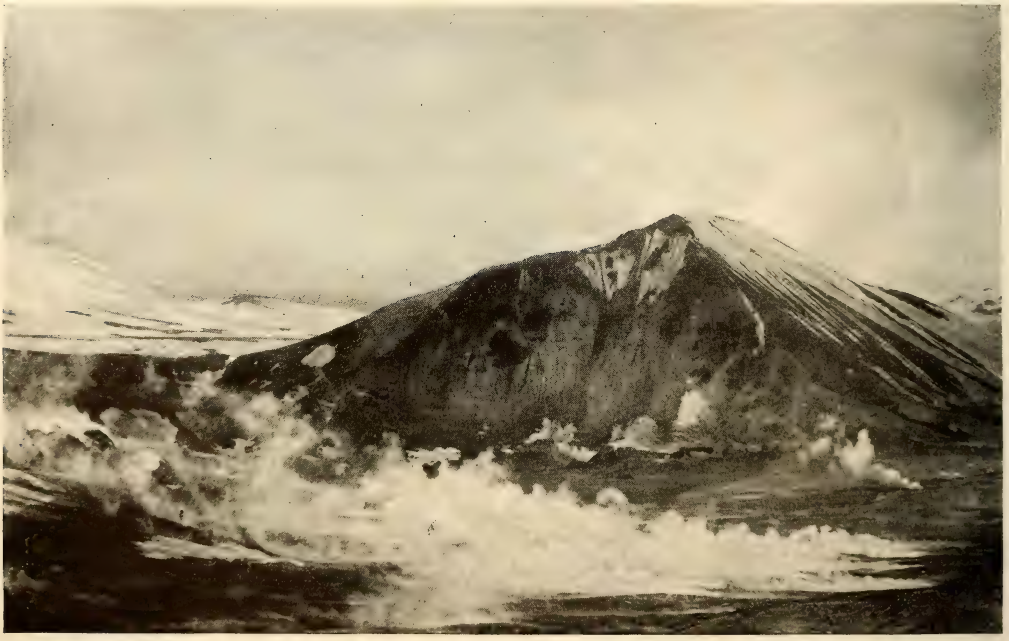


Photographs by R. F. Griggs

FUMAROLES AT THE CORNER OF BAKED MOUNTAIN

We all wanted to come down at night and see if the throat of the fumarole shown in the upper illustration was *red hot,* but no one cared to try to find his way around in the dark.

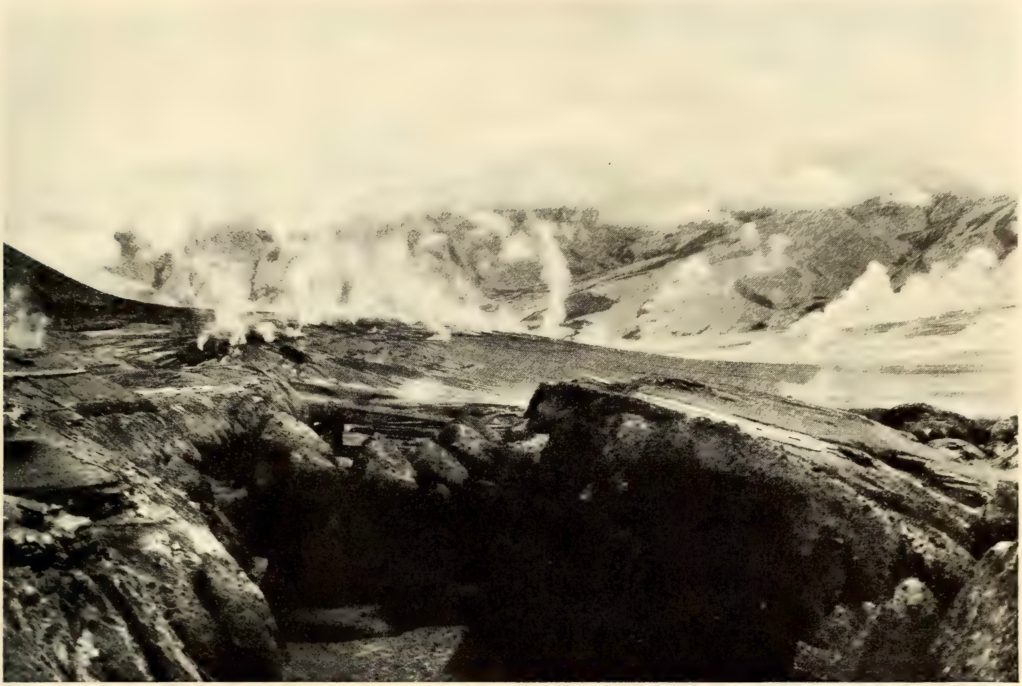
THE FLAG OF THE "GEOGRAPHIC" IN THE VALLEY OF TEN THOUSAND SMOKES



Photographs by R. F. Griggs

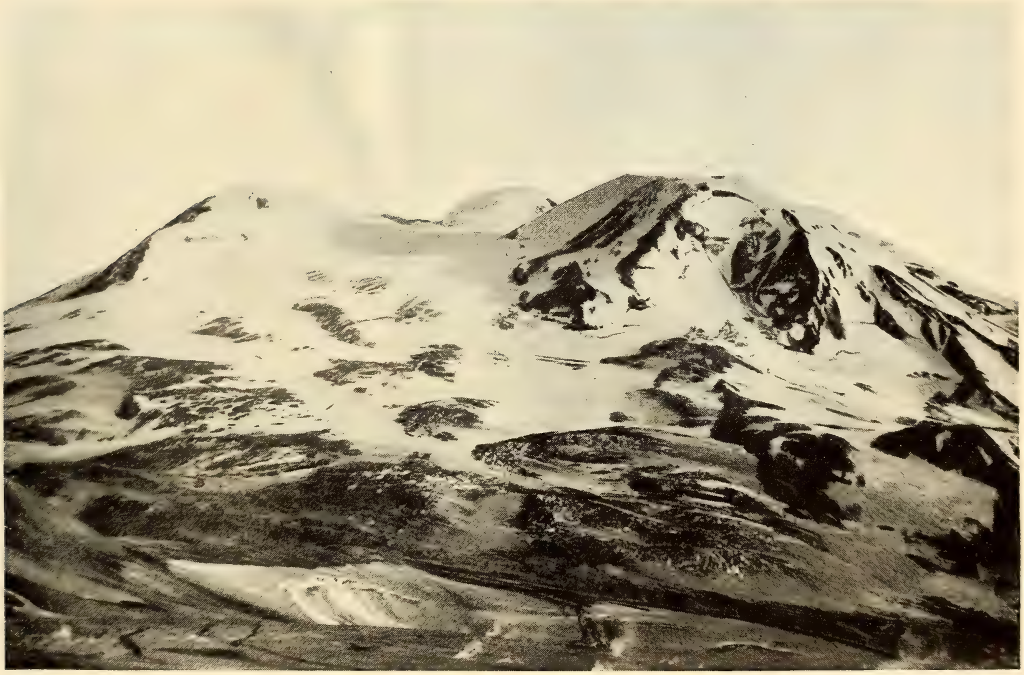
FALLING MOUNTAIN FROM ACROSS THE VALLEY

Avalanches continued their galloping succession down the gouged-out face of Falling Mountain with quite enough frequency to satisfy the newcomers, although they were a little less regular than in 1917 (see text, page 248).



Photograph by R. F. Griggs

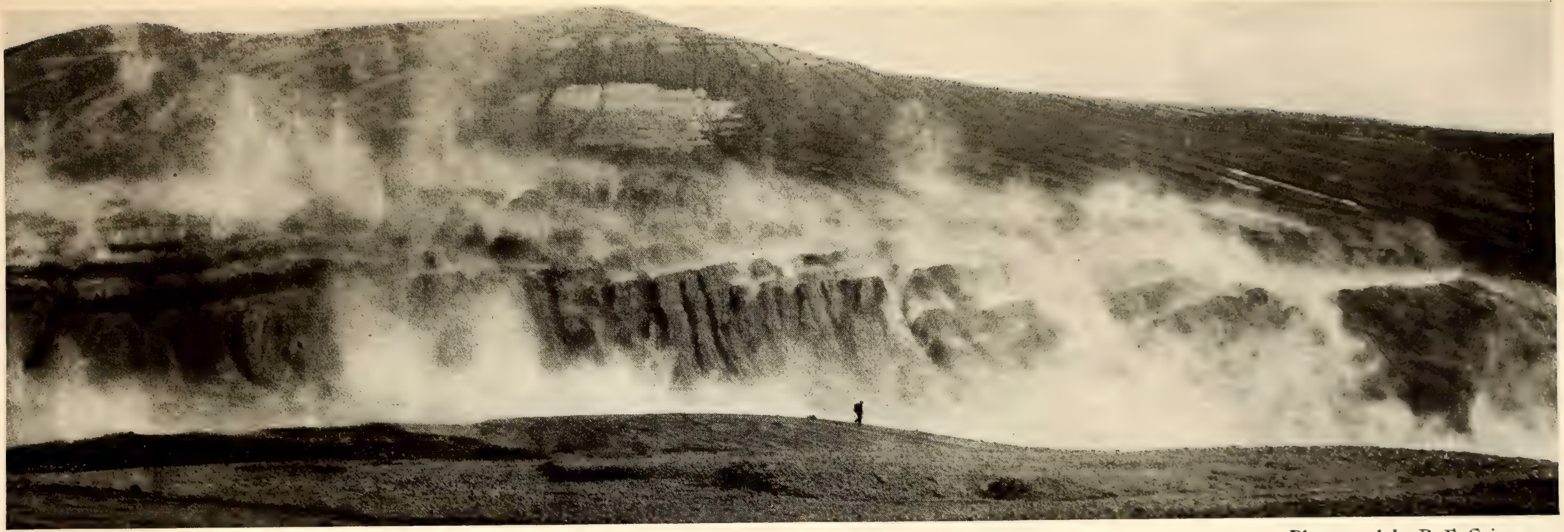
ONE OF THE GAPING FISSURES ALONG THE MARGIN OF THE VALLEY



Photograph by Frank I. Jones

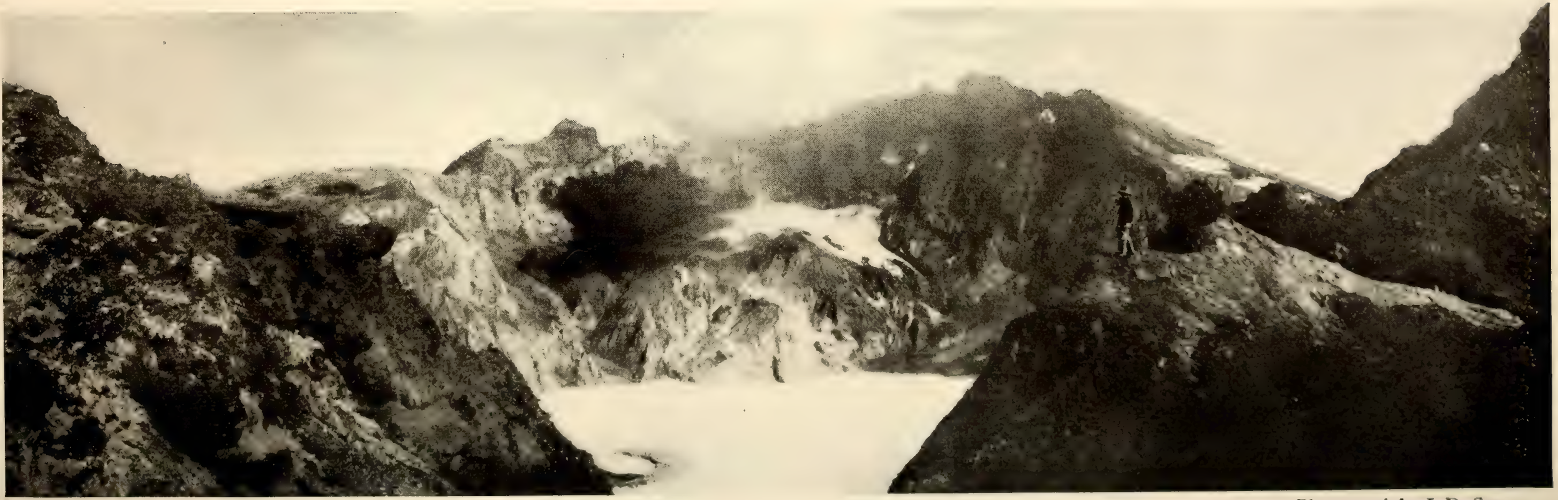
MOUNT MAGEIK FROM BAKED MOUNTAIN CAMP

The towering form of Mount Mageik, with its pillar of cloud rising high in air, is a landmark for the whole region. It stands directly across the head of the Valley of Ten Thousand Smokes.



Photograph by R. F. Griggs

STEAMING FISSURES NEAR NOVARUPTA



Photograph by J. D. Sayre

LOOKING DOWN INTO KATMAI, THE GREATEST ACTIVE CRATER IN THE WORLD

A single step would plunge the man on the edge to destruction. The crater rim is as sharp as a gabled roof. Inside the slope is almost vertical.

have presented a spectacle, if it could have been seen through the impenetrable black cloud that rose from its surface, far surpassing the weirdest image of the infernal regions ever conjured up by poet or preacher in an effort to picture the place of everlasting torment.

The spectacle presented by this tremendous outflow of incandescent sand was not seen by human eye. But even the stiff, cold mass lying on the ground where its movement ceased is one of the most impressive features of the Katmai National Monument (see page 228).

A CUBIC MILE OF INCANDESCENT SAND

Not only did the flow continue down the main arm of the valley toward Naknek Lake for 17 miles, but it also ran back across the divide behind Novarupta Volcano and completely encircled the Broken Mountains, coming down a side valley under Knife Peak to join the main flow again several miles downstream. More surprising yet, a quantity of it was poured out high up in Katmai Pass, whence it ran both ways, sending one tongue down to the base of Observation Mountain on the Pacific side of the range, while another flowed down into the main valley between Cerberus and Falling Mountain (see map, page 227).

Its greatest length is thus 20 miles, while its greatest breadth is 9 miles. The total area covered is 53 square miles.

Over most of this area the depth of the flow is so great that no indication of the original height of the ground remains. It is impossible, therefore, to estimate the thickness of the mass. Only around the edges and near its terminus can one find any stream canyons or fissures that cut through it (see page 229).

The deepest canyon exposes a section about a hundred feet thick, but there are the best of reasons for supposing that its thickness must be much greater than that over the larger portion of the valley. It seems quite safe to estimate its total volume as greater than a cubic mile!

A cubic mile of incandescent sand! The figure is so large as to pass comprehension. If a gang of contractors with steam-shovels should start to load it onto flat cars, they would find that before they had finished they would have filled a train that would reach entirely around the world and still leave a considerable pile of it untouched.

Pulverized as it is, the material may justly be compared with crushed stone, for in composition it is similar to granite. If it had been permitted to crystallize deep down in the interior of the earth, it would have become granite.

In seeking to gain some conception of the magnitude of the operation by which it was produced, we may inquire how long it would take our stone-crushers to pulverize a similar mass of granite into road-making material. The answer is that the sand flow is equivalent to the output of all the stone-crushers in the United States for a period of one hundred years!

OBJECTIVES OF OUR LAST EXPEDITION

In piecing together a narrative of the events of the eruption that gave birth to the Ten Thousand Smokes, we have in a certain sense put the cart before the horse, for the sifting of evidence that has made the preceding account possible required a large amount of time and study.

The various aspects of volcanism described by previous expeditions are so exceptional and so helpful to an understanding of many puzzling problems of the volcanic mechanism that I felt our findings were too important to stand alone without corroboration by other observers. The scientific world would indeed be justified in some skepticism over such remarkable reports until they were independently confirmed by other observers.

After a survey of the field, it was decided that no other organization was so well equipped to handle some of the varied problems encountered as the Geophysical Laboratory of the Carnegie Institution. Accordingly, this institution was invited to send a party with the National Geographic Expedition of 1919, under a coöperative agreement, whereby the National Geographic Society undertook to assume the field expenses of the party, while the Geophysical Laboratory agreed to work up the results on the return.

The production of a moving-picture record of the wonders of the region occu-

Photograph by L. G. Folsom

THE ONLY WOMAN WHO EVER BEHELD KATMAI CRATER

Mrs. Griggs, spurred by an unconquerable optimism, climbed through the fog all the way, while a party of the men lingered behind, waiting in vain for a break in the clouds. She was rewarded by coming into clear air just before reaching the rim, but some of the men went home without having ever beheld this wonder of wonders.

pied almost as important a place in our plans as the more technical scientific observations. Still pictures at best can give only an inadequate conception of the place. But the motion pictures brought back by the expedition, showing the majestic rolling columns of the big volcanoes, the sizzling fumaroles, and the leaping salmon, are the next thing to a view of the marvels themselves. The members of The Society, some of whom have had opportunity to see these films, will be glad to know that such a record of these unique phenomena has been preserved.

The activities of the expedition were so varied in 1919 that the men were kept scattered at different camps throughout the season. It thus happened that some of the men hardly saw each other during the whole summer. Folsom, for example, did not meet Sayre until August 21, when the season's work was almost done.

At no time were all the members of the expedition assembled on one spot. The largest group was assembled at Kodiak, after the field season (see page 258); but there were three faces missing, for Jones had been compelled to leave early and Jacob, with Ralph Hagelbarger, had returned through the Bering Sea with a cargo of specimens too heavy to be carried over the pass.

PERSONNEL OF THE EXPEDITION

There were nineteen of us in all: The Director; the Geophysical Party, consisting of Dr. E. T. Allen, chemist; Dr. C. N. Fenner, petrologist, and Dr. E. G. Zies, chemist; Prof. J. S. Hine, of the Ohio State University, zoölogist; J. D. Sayre, topographer; Paul R. Hagelbarger, topographer; Emery C. Kolb, of the Grand Canyon, motion-picture man; Frank I. Jones, of Portland, Oregon, color photographer; Lucius G. Folsom, assistant to the Director; A. J. Basinger, Ralph Hagelbarger, Richard E. Helt, William L. Henning, Harry E. Jacob, August E. Miller, Julius Stone, Jr., H. N. Wallace, and Charles Yori, assistants.

It would be hard for any one who was

Photograph by E. C. Kolb

MOUNT MAGEIK FROM THE ASH FLATS

The elderberries and bunches of grass have come up through a heavy blanket of ash and pumice.

not along to realize how these men worked for the success of the expedition. No task, however difficult or disagreeable, was too great, whenever it was recognized that it was for the good of the expedition.

Many of the tasks for which there were volunteers in plenty would have been altogether unreasonable in the eyes of any except men who were there for the love of overcoming difficulties.

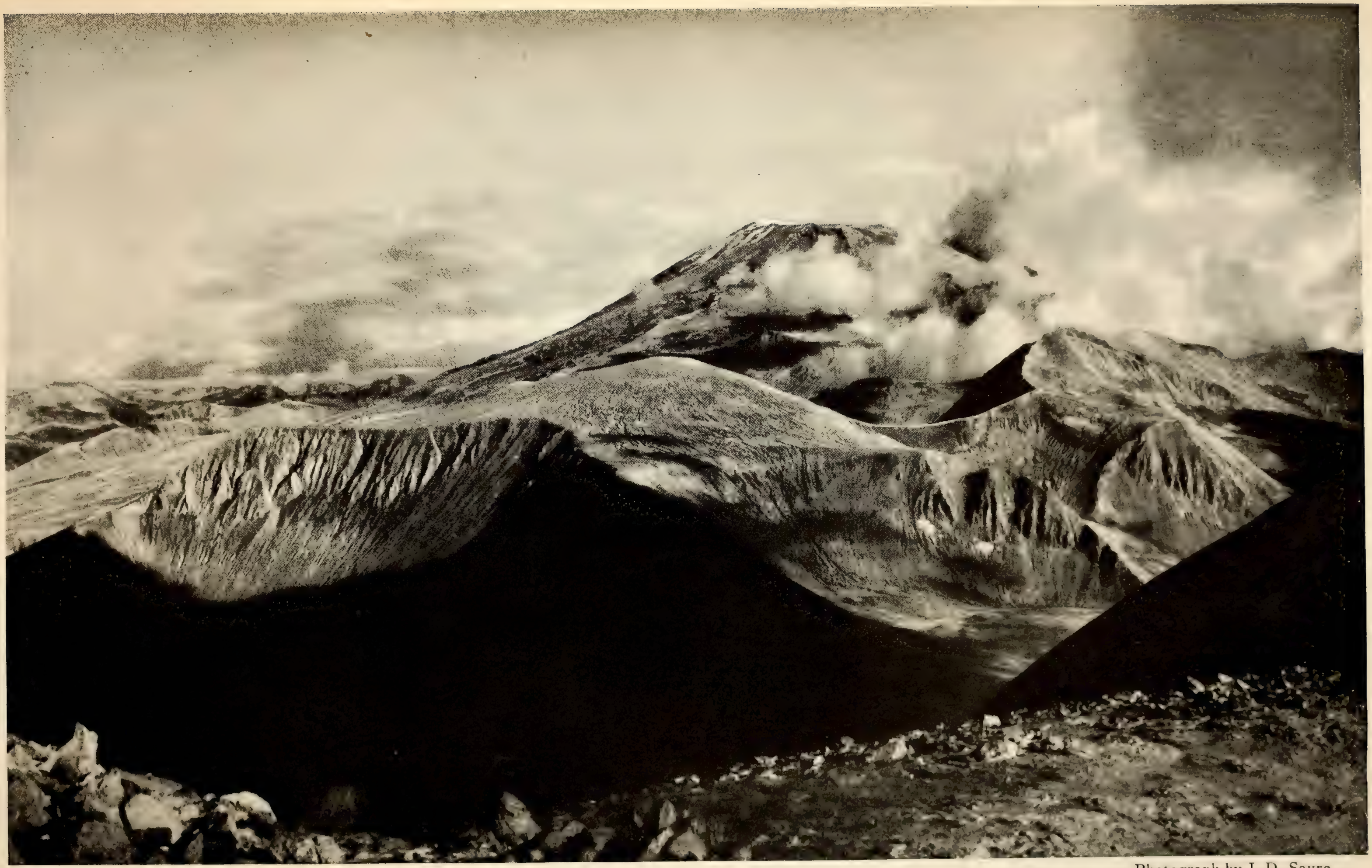
In addition to the regular members of the expedition, visitors were received for the first time. The first "tourist" to visit the Katmai National Monument was Rodney L. Glisan, of Portland. Later in the summer the wives of the three members of the expedition whose families were at Kodiak—Mrs. Griggs, Mrs. Folsom, and Mrs. Kolb—also came across and visited the valley, thus proving that, despite the necessarily primitive conditions, the place is by no means impossible for women (see page 242).

"LINING" SUPPLIES UP THE RAPIDS

Although there was some uncertainty in advance as to the possibility of "tracking" our supplies through the rapids by lining the boats, it had been decided that the chances were favorable to success. When the Naknek section of the expedition, under the leadership of Sayre, arrived, they found the river extremely low—so low that there was considerable difficulty in getting the boats over the bars.

Nevertheless, it was found that as much as 1,500 pounds could be tracked up in a single load, which was far more than we had dared anticipate. At the time, the low water, with its shallows, was considered a considerable handicap, but, as we found later, to our sorrow, it was extremely lucky for us that there was no more water.

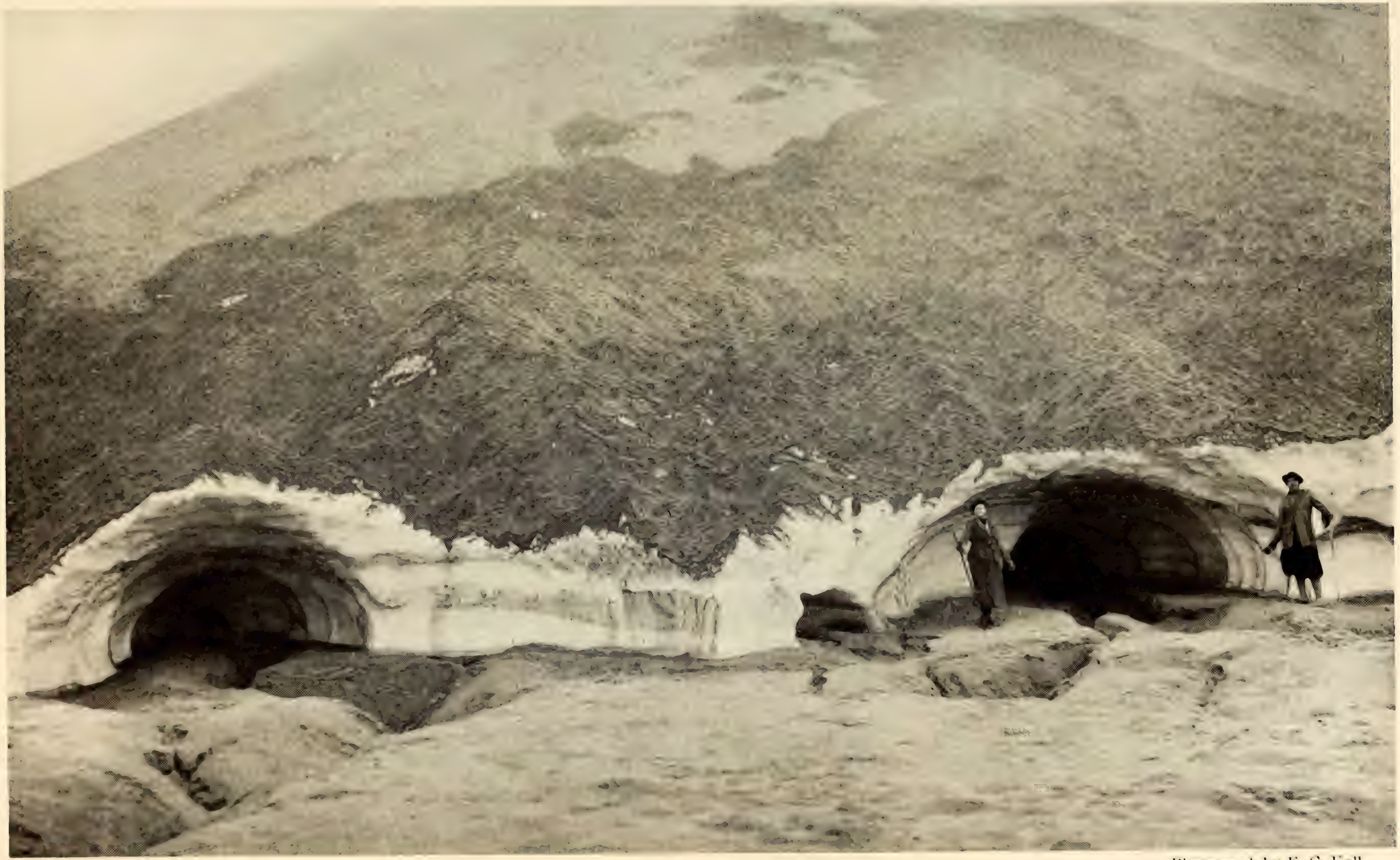
Any one who has tried it knows that lining a boat through swift water is hard work. It took three men, two on the towline and one to fend off, at the bow of the boat, and in many places the water was so swift that the combined efforts of all three were barely sufficient to move it against the swift current. Yet, with all its difficulties, a day of this work is much easier than a day with a pack on one's



Photograph by J. D. Sayre

KNIFE VOLCANO, WHICH OVERHANGS THE NORTHERN ARM OF THE VALLEY (SEE MAP, PAGE 227)

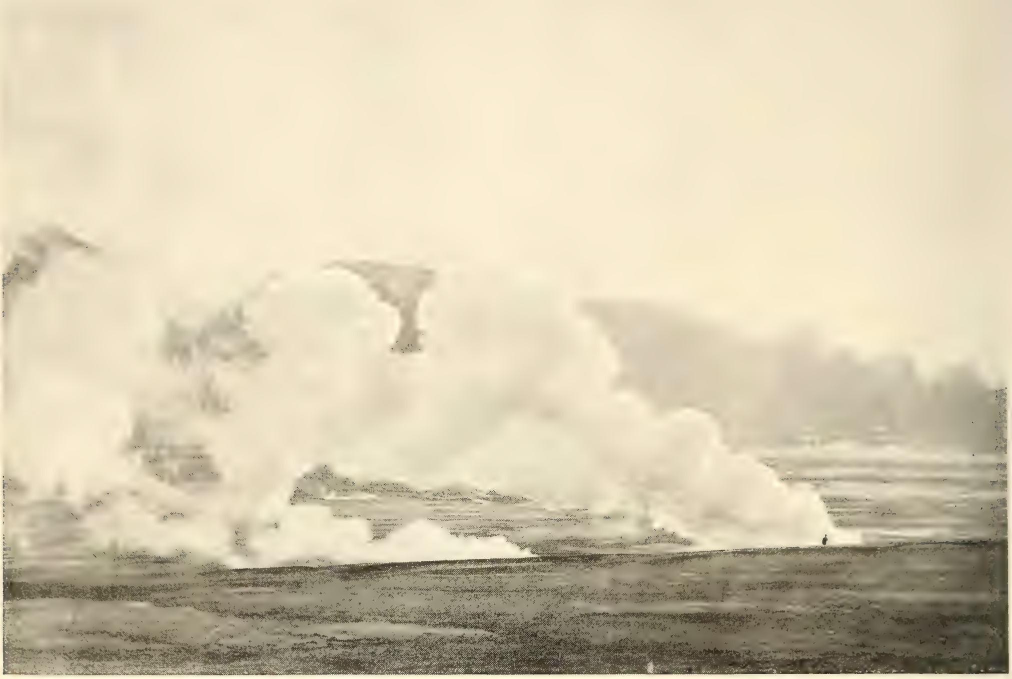
This volcano is the highest mountain in the Katmai region, overtopping Mageik and all the rest by several hundred feet. It is not at present active, but the snow melts off its flanks sooner than from any of the other mountains round about. Prior to the National Geographic expeditions, this mountain was not known as a volcano, nor had it ever been photographed.



Photograph by E. C. Kolb

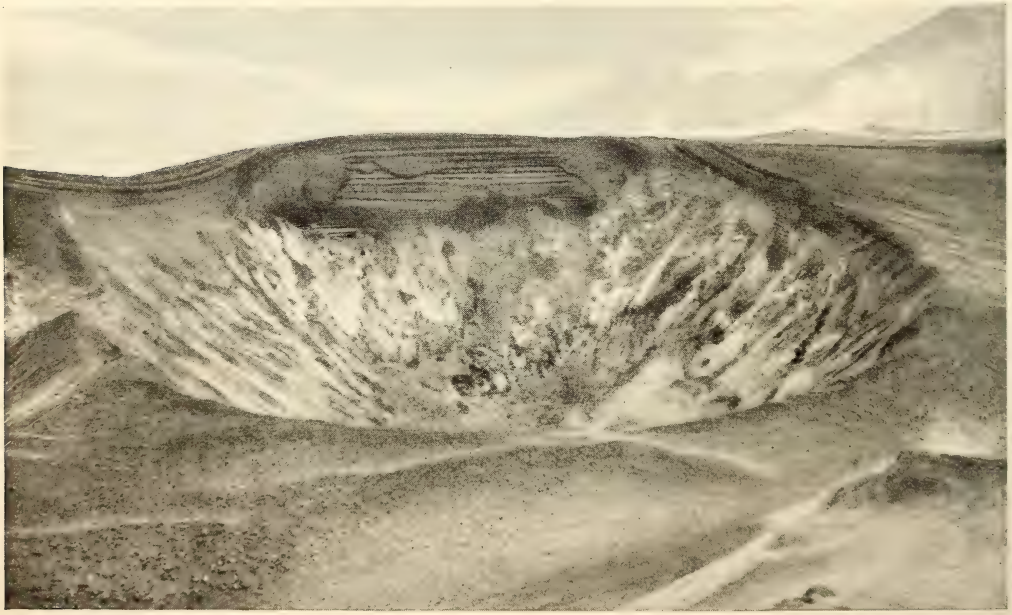
AN ASH-COVERED SNOWDRIFT ON THE EDGE OF THE VALLEY OF TEN THOUSAND SMOKES

The heat from the ground melts out great tunnels in the snow. The water coming out from under the melting snowdrift is sometimes actually warm to the touch.



Photograph by Frank I. Jones

FUMAROLES IN FRONT OF BAKED MOUNTAIN CAMP



Photograph by R. E. Helt

ONE OF THE MANY CRATERS IN THE SAND-FLOW

The presence of these craters is evidence that explosions occurred after the general body of the hot sand-flow had come to rest. The whole surface of the east arm of the valley is pitted with craters like this. Many of them are the seats of vigorous fumaroles.

back; and, besides, one has the satisfaction of knowing that he has accomplished three times as much.

But when the wished-for high water came we found that it was another story. Later in the summer the river rose three feet, covering all the shoals and rising up over the grassy bank. Then we had our troubles, sure enough.

The last time we tried the rapids was when Kolb, Helt, and I had gone down to Naknek to attend to some business at the cannery, late in July. We found at once that the increased swiftness of the water far outweighed the advantage of greater depth. In many places where we had been able before to find good footing on the bare gravel bars, we were now driven to cling to the steep, slippery bank with water, too swift to stand against, racing beneath.

Many were the places where, in spite of our best efforts, we slid off into the river with a splash. If there had not been two of us we could never have held the line, much less hauled the boat forward; but when one fell, the other held, often having to take a turn around one of the tree trunks, which were otherwise unmitigated nuisances, as we clambered under and around their leaning branches.

But, to our surprise, we found the worst going along the comparatively level grass banks, where the water, working among the clumps of grass roots, had eaten away great holes which could be neither seen nor avoided.

As we went pushing along, shoulder deep in the tall grass, splashing through shallow water, we would suddenly drop clear out of sight into a little pocket of a hole deeper than it was wide. Out again, over a yard of resistent grass roots, and then plump into another hole!

In places there were stretches of upward of a hundred yards where the ground was honeycombed with holes of this sort. Long before we reached the head of the swift water we were dog tired, but there was nothing to do but keep on.

Toward the end our incentive to keep going was the knowledge that if we could only stick to it a little longer we could go ahead across the lake on the morrow without further occasion for getting wet—no small matter when we had only one change of clothes and no chance of drying out.

We were surprised to find that the season was later on the south side of the peninsula than on the Bering Sea side. We had feared that the lake might not break up in time to permit Sayre's party to reach the head of navigation at the appointed date. But, as it turned out, it was we on the other side who were delayed. It was the first day of June before we were ready for a try at the pass and the valley beyond.

FIRST TRIP TO THE SMOKES

The calm of the early morning, which had induced us to believe it a suitable day for the attempt, gave way soon after we had started to squalls of rain, sleet, and snow, which, driven by fierce cold wind into our faces, made us almost sorry we had started.

Everywhere, except on the lowlands close to camp, the ground was covered with soft, wet snow, through which we had to plow our way, sinking halfway to our knees at every step.

In the monotony of the weary grind up hill we scarcely realized how hard we were working until, coming to little patches of bare ground where we could swing out free, we felt as though we had suddenly taken wing, so great was the relief.

As we neared the pass our nerves tightened with expectancy—Kolb, who alone was with me, wondering whether the thing would after all be as wonderful as the stories; and I, my mind full of the picture of that memorable day two years before, when I had taken leave of my wonderful valley, anxious to see what changes time had wrought.

When we reached the pass we found the upper flat all blanketed with snow. The little twin fumaroles that had first beckoned me into the valley were nowhere to be seen. I knew that they had maintained faithful watch all through 1918, but I could not help wondering whether they had really gone out or whether they were merely overcome by the mass of snow that had drifted over them.

I peered over the rise, half a mile be-

Photograph by Frank I. Jones

MOUNT MARTIN FROM BAKED MOUNTAIN CAMP

The crater is thirteen miles distant in a straight line. After leaving the first slopes, five miles away, our path led entirely over ice and snow. Some of the glacier-work was extremely hazardous (see text, page 267).

yond, that hid the valley itself. Nothing was to be seen. Had it, too, succumbed? But, as I looked, a puff of vapor rose up and joined the clouds above. No, the Smokes were still there.

Saying nothing to Kolb, for I wanted him to be taken by surprise, I pressed on. But the puffs kept coming, another and another, so that it was not long until he saw one for himself. When finally we surmounted the rise and looked over, there they lay, spread through the whole valley, exactly as when we first beheld them. No snow there! (see pp. 237, 272).

THE TEN THOUSAND SMOKES IN 1919

What a contrast to the snow-covered valley leading up to the pass! Except for a few patches in cool spots around the margin, it was as clear and bare as in midsummer.

The general appearance of the valley was the same as it had been in 1916, when first discovered, but after we had had time to examine it somewhat in detail, we could observe some slight indications of a slackening of activity around the edges. The little fumaroles between Cerberus and Mageik, at the head of the valley, of which there were about a hundred in 1916, 1917, and 1918, were reduced to two or three in 1919.

At the foot of the valley a large number of springs of boiling water had started up in areas where there had been nothing but steam previously. The temperatures of some of the fumaroles in the same area were markedly lower than the year before (see page 235).

Falling Mountain, likewise, though active enough to satisfy the newcomers, did not shoot forth its avalanches with

Photograph by R. F. Griggs

MOUNT MARTIN FROM THE PACIFIC SIDE

Three times we climbed this volcano and once descended inside its crater, but in our attempt to study it we were baffled by the fog, which each time shut down and kept us from seeing what we sought to observe (see text, pages 269 and 270).

quite the same frequency as in former years. The old volcanoes—Katmai, Trident, Mageik, and Martin—also were less vigorous than in 1916 and 1917.

It is by no means certain, however, that this indicates that the activity of the region is dying out. The big volcanoes, which alone were known at that time, had a similar slackening in activity in 1915. We could not be certain that year whether Katmai was active at all, and the steam from Trident could not be seen except under favorable atmospheric conditions. But the two following years the activity of both these vents increased measurably, so that no one would have questioned the reality of the steam clouds issuing from them.

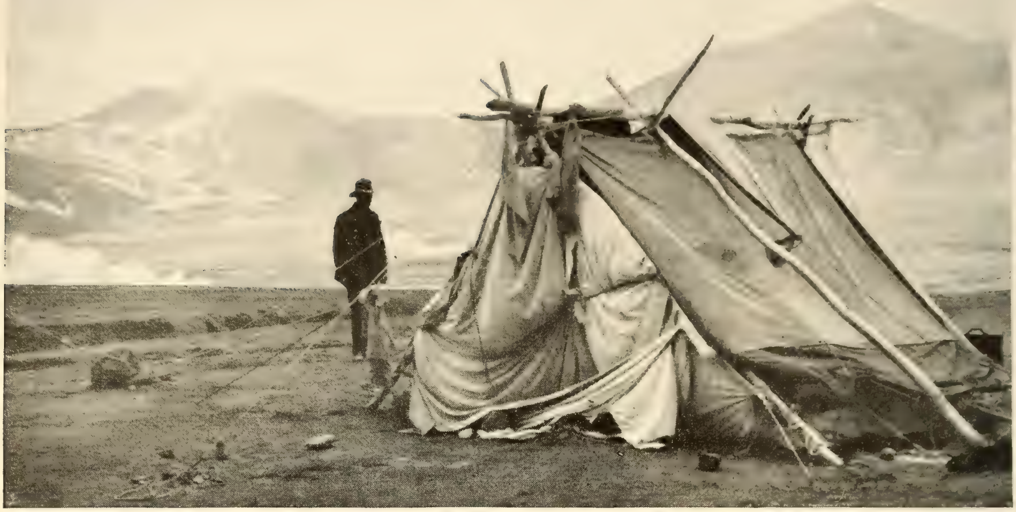
Whether the slackening of the activity of the valley vents observed in 1919 was simply such a temporary fluctuation or whether it represented a permanent quieting down can only be judged by the future. In either case, there is no reason to expect any sudden extinction of the Smokes, for the changes observed were so slight that we could not be certain that there was a real slowing down of activity until after many days of observation and comparison.

Although some signs of a diminution of activity were detected around the edges of the valley, the geophysicists found temperatures very much higher than any that had been measured before—higher, indeed, than any of us had believed to exist in the valley.

MELTING LEAD AND ZINC IN THE FUMAROLES

It was late in the season before any of these hot places were discovered, and all felt that if only there had been more time certainly more hot ones and probably others with even higher temperatures would have been found; but the increasingly bad weather put a stop to further efforts in that direction.

Well do I remember the excitement when Dr. Allen, coming in late one evening, announced, "Three times have we melted zinc this day." They had found three widely separated fumaroles with temperatures above the melting point of zinc (419° C., 784° F.). The hottest of these was practically five hundred de-



Photograph by R. F. Griggs

THE "DEFENSES" OF BAKED MOUNTAIN CAMP

Profiting by several sorry experiences, Yori finally shored up the tents so thoroughly as to bid defiance to the winds, but it was no use. The condition of the camp when the next storm cleared away is shown on the opposite page (see text, page 270).

grees centigrade (496° C., 915° F.). This was found in a fumarole where the steam broke through a myriad of small holes in the roof of a bridged-over fissure.

The volume of gas coming from any one of these was so small that it could be approached as closely as might be desired. One could readily reach into the hole with the end of a foot rule held in his hand. Within five seconds the stick would begin to smoke violently, and when drawn out its end would be a glowing coal. In less time than that a bar of lead tied to the stick slumped down and melted away (see color plate, page 275).

KINDLING A FIRE BY PLUNGING A STICK INTO WATER

Even this performance was eclipsed next day when the chemists came in, reporting several temperatures far above 500° C.; the highest was 645° (nearly 1200° F.). This was measured in a small orifice, not over two inches in diameter, located at the bottom of a crater-like pit eight or ten feet across. It was so inconspicuous as never to have excited the curiosity of observers, although it was but little removed from the trail which we used constantly as we traveled up and down the valley. The gas, which appeared to be almost pure steam, was, however, so blue as to arouse Dr. Zies' suspicion and so resulted in the discovery of its temperature.

If it had not been located at the bottom of a pit, this fumarole also might have been reached with a foot rule, but on account of its situation it was not quite so accessible.

When we put an aluminum cup into this steam it was quickly softened, so that it could be cut with a knife like pewter; yet it showed no signs of fusion, for the temperature was still somewhat below the melting point of aluminum. The tinned handle was vigorously attacked by the gas, but the body of the cup itself was neither corroded nor tarnished in the least degree.

Then we cut the end of a walking-stick into a brush of shavings and thrust it into the steam. Instantly it began to smoke and char, but nothing further happened until we jerked it quickly into the air, when it burst into flame. We had,

Photograph by R. F. Griggs

THE WRECK OF BAKED MOUNTAIN CAMP

Nearly a thousand feet of cordage had been used in lashing the poles together to resist the weather. The wreck was so heavily drifted over by flying pumice that it took the combined strength of two of us to peel back the fallen roof and get at the duffle on the floor.

therefore, the very curious sensation of kindling a fire by plunging a stick into water (see page 237).

A RED-HOT FUMAROLE

All of the high temperatures measured were found in such relatively small and inconspicuous fumaroles as these, rather than in the big vents, which would at first impress any one with their tremendous heat. The real temperature of the gas in the big vents when it first emerges is probably quite as high as in the little ones, but the wide-open throats which the force of the escaping gases has blasted out permit the emanations to cool down considerably before reaching the surface.

On this account the biggest and most impressive vents, those which are actually delivering by far the greatest quantities of heat, are seldom more than two or three times as hot as ordinary steam. Their temperature, although far beyond that ever found in a steam-boiler, and so high that the steam is perfectly dry and transparent as it comes forth, is yet far below the kindling point of wood.

In the hottest vent the steam is not only so dry as to show no signs of condensing for a long distance, but is so highly heated that in the dark the orifice from which it comes must glow with a faint redness. Indeed, one could almost call it "red-hot steam"; but by reason of its transparency no glow would be visible in a small body of it.

All of us would have liked to see a red-hot fumarole, and there was much talk of going down to the vent to observe it at night; but when it came to making the trip no one was exactly ready to undertake the job, for none cared to try to pick his way among the fumaroles in the dark! (see page 237).

BEARS INVESTIGATE THE FUMAROLES

In the seven years since the formation of the fumaroles, the country round about has gradually become populated by a new generation of bears, which, having grown up in the vicinity of the valley, have come to regard it as one of the normal elements of their world.

When first discovered, the active area was as absolutely devoid of living creatures as can be imagined. The next year

Photograph by L. G. Folsom

SORTING OUT THE WRECKAGE AFTER THE STORM AT BAKED MOUNTAIN

We looked and felt very much like rag-pickers on the dumps, but among the wreckage were many of our most cherished possessions (see page 285).

we found the track of a single bear which had ventured to cross the valley. But in 1919 bears were frequent visitors, comprising, indeed, the only tourists that had yet visited its confines. Not merely here and there, but in many places, their tracks were to be found all through the valley. It was not the work of any single bear, nor made at any one time, for the tracks were of many sizes, showing that most of the bears of the region probably enter the place from time to time.

They were not satisfied with merely crossing through the steaming areas, but were apparently attracted in some degree by the Smokes. Their tracks were often to be found close around the largest vents, even far up toward the head of the valley, where they were many miles from any possible food. From their behavior, indeed, it seems not at all impossible that they may have been attracted by the warm ground and have sought out good places to enjoy the heat, just as a dog stretches out in the hottest place behind the kitchen stove.

But we could not assure ourselves on this point, for we never caught sight of them in the valley, and the ground around the big fumaroles is baked so hard by the heat that only claw-marks remained to show where bruin had walked. If he lay down, his shaggy coat left no mark on the hard crust, so we could not follow all his activities.

BRUIN STARTS A FUMAROLE OF HIS OWN

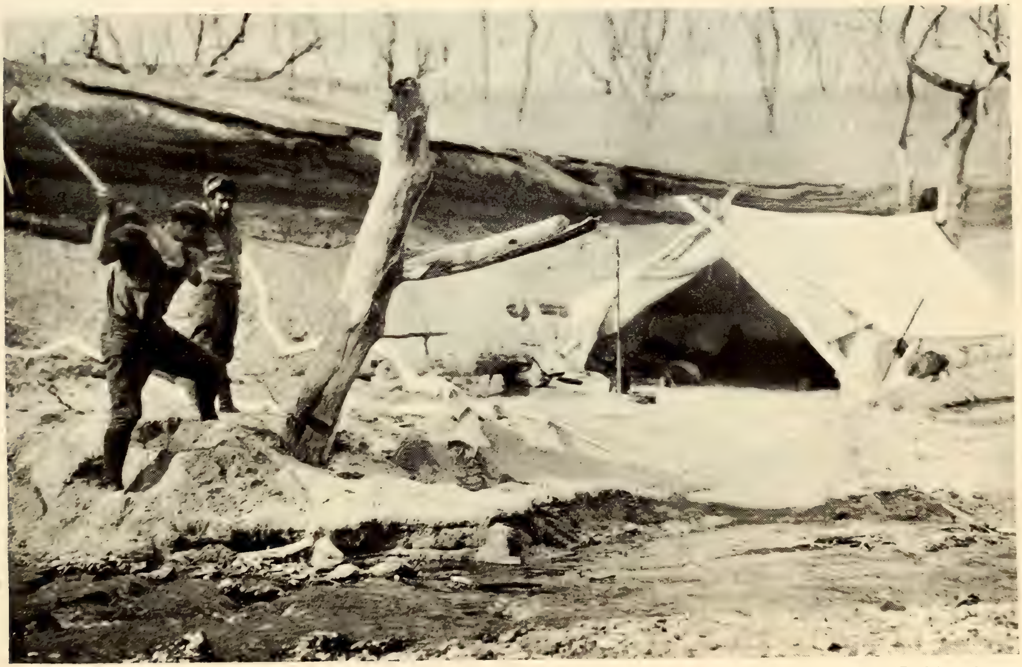
It was not unusual to find tracks of a bear leading straight up to one of the large vents, where he had evidently stopped to peer into the mysterious hot hole. In one of the steaming areas Hagelbarger found places where the hot ground had evidently excited the bear's curiosity, for he had dug into it with his claws until he started a small fumarole of his own.

The appearance of a cloud of steam under his claws as he broke into the hot crust must have provided bruin with a great surprise, but it did not scare him away, for he was not satisfied with a single experiment; he tried again in several places, each time digging down till he started the steam.

Photograph by E. G. Zies

UKAK CAMP

The refuge to which we fled during the storm at Baked Mountain (see text, page 279).



Photograph by W. L. Henning

EROSION IN VOLCANIC ASH

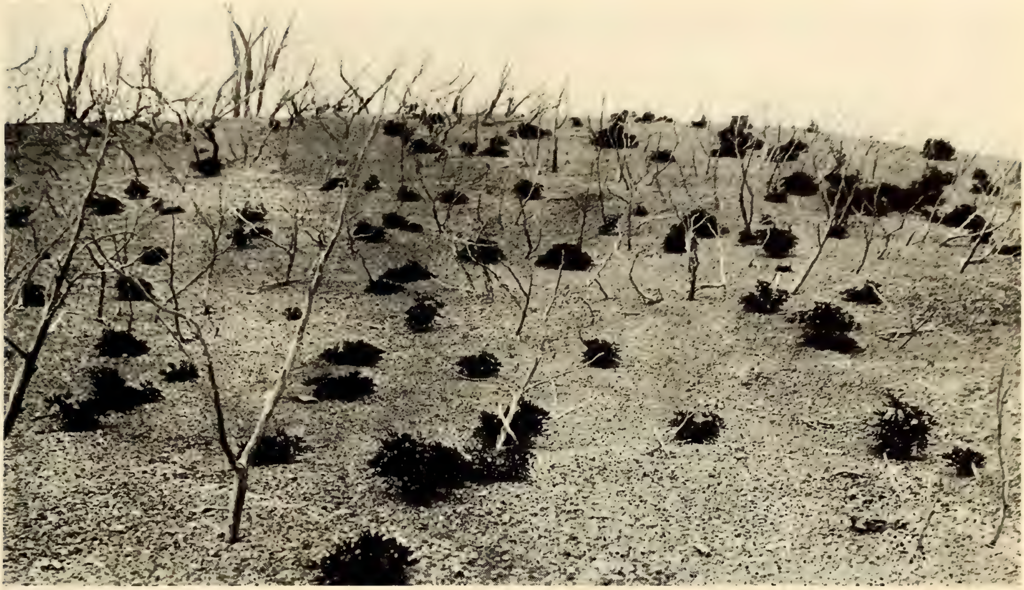
We cut off the top of this tree in 1917 at a then convenient height above the ground. So much ash has washed out in the ensuing years that the cut end now stands nine feet above the ground.

Photograph by Frank I. Jones

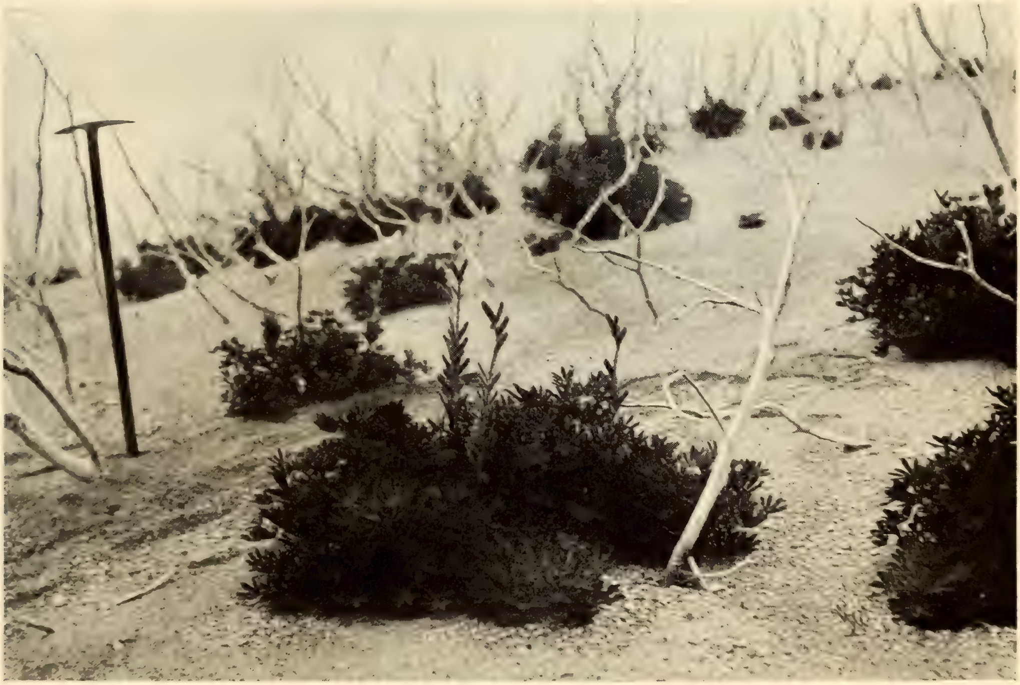
A JOB FOR A TIGHT-ROPE WALKER

THE BRIDGE OVER MARTIN CREEK

All the materials for color photography were in this pack; if Jones had slipped there would have been no illustrations in color (pages 271 to 278) to show the members of the National Geographic Society. Some of the boys hesitated a long while before trusting themselves on those wet, slippery logs. I am proud to say, however, that when Mrs. Griggs came to it she marched right across, just as though it were a yard wide.



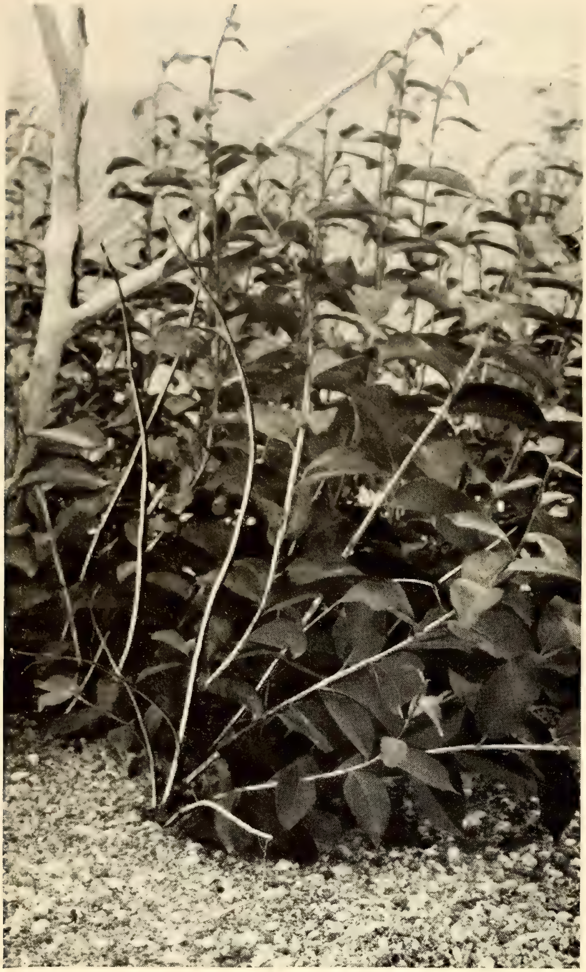
LUPINES COMING UP IN AN AREA OF DEEP ASH



Photographs by R. F. Griggs

FRUITING LUPINES GROWING IN DEEP ASH DEPOSITS

These plants are the most successful pioneers in the process of revegetation, because, on account of their root tubercles, they obtain nitrogen from the air, while most other plants are dependent on organic compounds. The vigor of the plants and the abundance of the fruit in the Katmai region afford ample evidence that soil conditions are not unfavorable in areas where plants are not killed by sand blast.



Photograph by R. F. Griggs

SAND BLASTS HAVE STRIPPED THIS ALASKAN WILLOW OF ITS BARK

All of the season's growth has come from the buds on the lee side of the twigs.

In addition to the bears, which never entirely deserted the region about the devastated country, many other forms of animal life are coming in.

On one of the little ponds we found not only several loons, but two or three pairs of golden-eye ducks, geese, and even a swan, which contributed an element to our larder that had been sadly lacking in former years; for we were thus permitted to enjoy swan cooked by the steam of the fumaroles. Better meat was never served at any table.

On the hillside round about, ptarmigan were nearly always to be found, while there were a number of colonies of ground squirrels, each with several hundred individuals, like a "town" of prairie-dogs. To complete the fauna were many short-tailed mice, busy about their affairs as they worked along the ground with little heed to the footsteps of the approaching explorer.

THE MARVELOUS COLORATION OF THE VALLEY

For the author, one of the most interesting incidents connected with the expedition was the wonder of the new members of the expedition when they saw for the first time the marvels of which they had read. While it was generally agreed that the pictures and descriptions had given them a fair idea of the Smokes themselves, they were unanimous in their opinion that the printed account conveyed no adequate conception of the coloration of the valley.

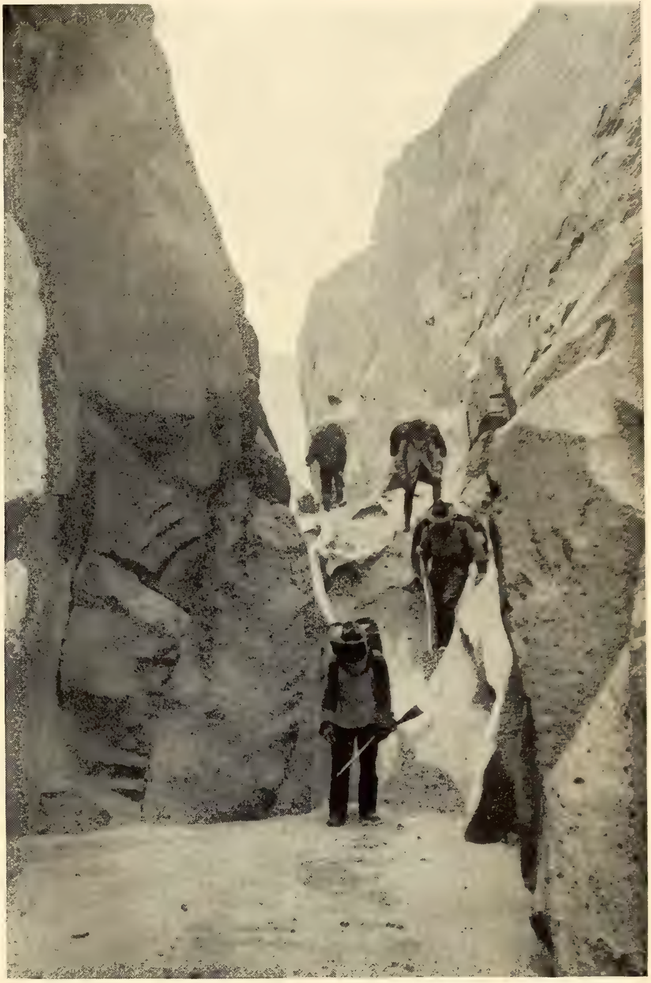
The previous articles had, to be sure, stated that the ground was painted with "all the colors of the rainbow," and that the "fissures were baked bright red for miles at a stretch"; but somehow it was imagined that these must be wild exaggerations rather than literal statements of fact.

COLORS BRIGHTER THAN THOSE OF THE GRAND CANYON

No one was more impressed with the colors than Kolb, who, having lived for years on the brink of the Grand Canyon, was not oversusceptible to striking colors. Along with most people, he had supposed that the canyon represented the climax of nature's colorings and had never expected to see anything more brilliant.

The color is, however, so altogether different in character from that of the canyon that the two cannot be properly compared. In the canyon it is in the distance that the color is most remarkable. In the valley it is in the foreground. There are no bright and sharply contrasting masses of rock in the walls of the valley. On the contrary, the valley itself, seen under the heavy clouds which usually cover it, is apt to convey an idea of somber coloring. But, when one comes up to the fumaroles, he is almost overwhelmed by the indescribable riot of color (see page 273).

The colors of the canyon are almost entirely due to the wonderful atmosphere and the brilliant light which floods its recesses. Under such leaden skies as usually prevail in the valley, even the canyon itself would show to very poor advantage. The reason why the valley fails for the most part to show much color at a distance is due in large measure to the fact that all the colors of the spectrum lie close together, so intermingled as to blend into neutral grays or browns when seen from a distance. But, while thus largely losing their effectiveness at a distance, the colors are for this reason all the more striking when seen close up, for then each is heightened by contrast with the other (see page 273).



Photograph by R. F. Griggs

THREADING A WAY THROUGH ONE OF THE CANYONS IN THE SAND-FLOW

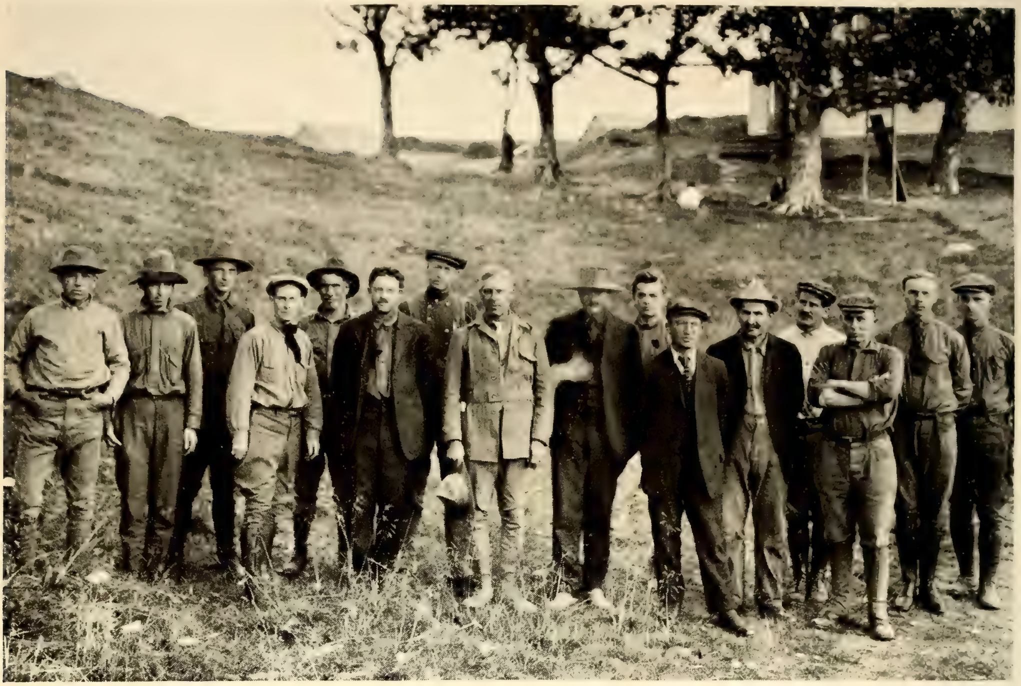
The sand-flow fills the Valley of Ten Thousand Smokes (see text, page 241).

The throats of the fumaroles and the ground around them are most often burned into some of the various shades of red which are familiar in the different tints of brick in common use. Sometimes it will be a light, pinkish tone; again a bright scarlet; or, in still hotter places, rich crimson passing into purple and black in some of the very hottest vents (see page 278).

With such deep-burned purple patches is frequently associated a bright orange deliquescent incrustation of the greatest richness. These two colors are most often found together in fumaroles bearing so high a concentration of acid as to have eaten away all soluble constituents, leaving spots of purest white silica standing in most pleasing contrast with the purple and orange.

In some places considerable areas are leached out to a gleaming white by the acid fumes. When to this are added faint tinges of pink and yellow, there results a beautiful flesh color of the greatest delicacy. Again, the ground color of red, white, or gray may be overlaid with copious deposits of pure yellow sulphur.

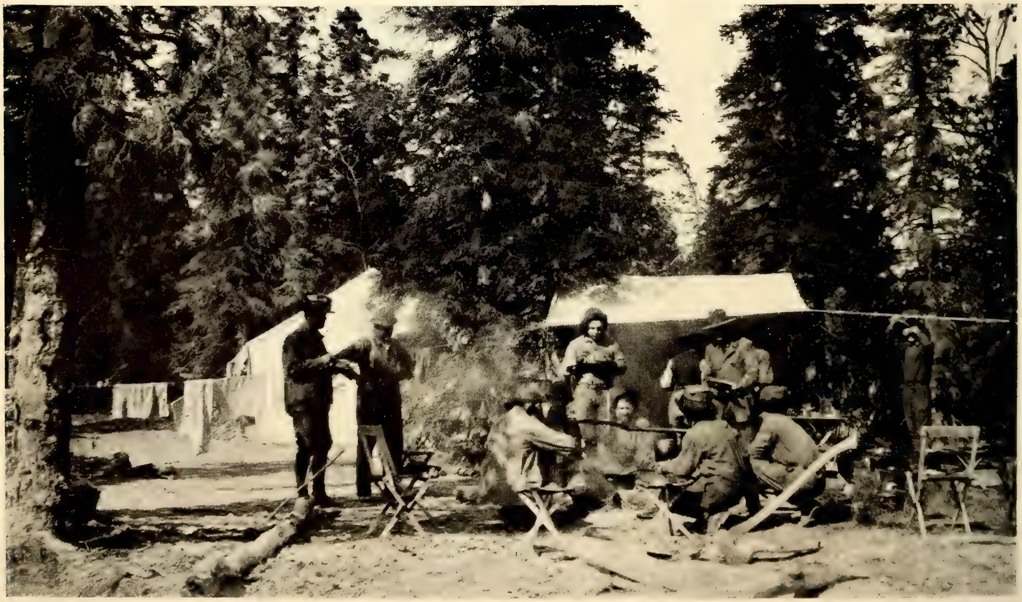
Bright colors are by no means limited to the large and vigorous fumaroles. Over many hundreds of acres in the valley, where steam is everywhere seeping up from beneath, the ground glows with the most brilliant colors imaginable. Sometimes it is black with the character and consistency of asphalt. This grades through various shades of blue into delicate light pearl grays or alternates, as



Photograph by Mrs. E. C. Kolb

THE LARGEST GROUP OF THE EXPEDITION ASSEMBLED IN ONE PLACE

Three men—Jones, Jacob and Ralph Hagelbarger—had left before the others came together. From left to right are Helt, Sayre, Paul Hagelbarger, Kolb, Yori, Griggs, Folsom, Fenner, Allen, Miller, Zies, Hine, Wallace, Basinger, Stone, and Henning.



Photograph by R. F. Griggs

THE BASE CAMP IN THE FOREST AT THE HEAD OF NAKNEK LAKE

We were much surprised on finding such forest within a dozen miles of the Smokes. A fox used regularly to bring her little family to our garbage pile, and Wallace shot a bear on the bench in front of camp. The Katmai National Monument is destined to become one of the great game preserves of the world (see text, page 285).

the chemical conditions change, with the various shades of red, while round about are the more ordinary ochraceous yellows and browns (see page 275).

SHOES DAUBED WITH VARIEGATED MUD AS FROM A PAINTER'S PALETTE

After a trip across such an area one's shoes, covered with the parti-colored muds, take on a resemblance to an artist's palette daubed with all possible colors in a confused medley. The fine-grained mud is indeed so similar to artist's pigments that it may be readily used as a substitute for them. With no other materials than mud from the valley and a piece of canvas from a ruined tent, Mr. Kolb painted several pictures that excite the interest and admiration of all who see them.

Where the ground is not too hot to prevent their growth, such places are covered with a layer of bright green algæ, adding the last color needed to complete the spectrum.

One of the most striking color combinations in the whole valley was produced by the growth of such algæ in one of the great conical craters whose general ground color was a bright orange ochre. In another place I came across a trail made a few days previously, where the depressed tracks had served to collect a little water which had so favored the growth of algæ as to make the tracks stand out green against the general brown surface. Occasionally, too, the incrustations have a coppery green color, but such deposits were never seen in quantity.

In other places one can find the most astonishing combinations of reds and blues and yellows by digging into the loose ground in the vicinity of a fumarole. The brilliancy of colors of such freshly exposed blocks is indeed quite beyond belief. One can simply stand and marvel at the never-ending variety of shades he uncovers, for each block is different from all the rest (see page 273).

But to convey by verbal descriptions any adequate conception of the gorgeous coloring is impossible. Even pictures colored as carefully as might be on the ground would not do, for the most gaudy mixture of colors that could be daubed over the canvas would not surpass the shrieking effects presented by our impressionistic artists as their idea of the coloration of the most drab and somber landscapes; wherefore, many would doubt the accuracy of any painted pictures.

Ever since I first beheld the wonderful display of colors in the valley, I have been extremely anxious to have them recorded by color photographs which should present what we had seen without the possibility of the personal equation entering in.

The problem was by no means easy of solution, for the obstacles to successful color photography, which are difficult to overcome at best, become greatly intensified in such a region as the Ten Thousand Smokes. The plates are sensitive to the adverse climatic influences, and must be guarded from the hot, damp ground with the most jealous care. The dust clouds which are frequently stirred up by the wind are so all pervasive that it is extremely difficult to keep things clean, and dust is much more serious in color photography than in ordinary black and white work, for, while films can be changed just before exposure, plates must be loaded beforehand.

On a black and white picture it is easy to touch out a spot, but in the Paget color process, which we used, any imperfections on taking-screen, plate, or viewing-screen must remain a permanent blotch on the picture.

THE COLOR PHOTOGRAPHS

Success in ordinary photography is dependent on one's ability to coördinate two or three mechanical processes—shutter speed, diaphragm, etc.—and at the same time to watch the subject and take the picture when conditions are just right. But in color work the number of mechanical factors is greatly increased, and the demands of artistic conception by the operator are greatly increased. It is, therefore, a rare man who can do such work successfully in the rough-and-ready conditions under which we were forced to live.

The difficulties were so great that I felt it wisest not to make any promises in advance of what could be done; but the results are so beautiful and preserve the natural colors with such perfect fidelity as to reflect the greatest credit on Mr. Jones for his careful patience and his artist's vision (see color plates, pages 271 to 278, inclusive).

LIFE AT BAKED MOUNTAIN CAMP

When we first camped in the valley, in 1917, we were so overawed by its volcanoes that our guiding maxim was "safety first"; but when we returned in 1919 we were willing to take a chance and experiment with things we had not dared attempt before.

At the suggestion of the photographers, the camp was placed at a corner of Baked Mountain, close beside some of the biggest vents in the valley, in a situation that commanded magnificent views of Mt. Mageik and Mt. Martin, and was at the same time convenient of access from all directions (see map, page 227).

Although this position proved untenable, as we afterward found from a series of disastrous experiences, it permitted camera men to secure some magnificent photographs which could not otherwise have been obtained. Pictorial conditions in the valley are so dependent on fleeting light effects that one cannot hope to obtain the pictures he wants except by camping on the spot and rushing out with his camera at favorable moments. The light is usually best either early in the morning or late at night. Our most successful pictures were taken at these times. The Alpine glow on the volcanoes reproduced in its natural color on page 277 is limited to a few moments after sunset, which in July occurs about 10 p. m. in the valley.

ACID FROM THE "COOK-STOVE" EATS THE POTS

As far as the conveniences of the camp were concerned, this location was all that could be desired. The big fumaroles in front furnished any degree of heat that might be needed for cooking, while the snowdrift directly behind the tents supplied an abundance of good water, as well as facilities for refrigeration.

The different situation required methods of cooking somewhat different from those we had employed previously. We soon found that it was impossible to hang a pot down into the fumaroles here, as we had done before. The steam from this group of fumaroles was highly charged with acid (either hydrochloric or hydrofluoric), which in the course of a few minutes attacked the rope to such an extent that it fell to pieces when we tried to pull out the pot. More embarrassing still was its effect on the pots themselves, for it was not long before they developed holes where the fumes had eaten away the aluminum.

Instead of attempting to hang the pots into a fumarole, therefore, we dug holes in the hot ground and banked up the steaming earth around them. The different holes we used stood at different temperatures, so that we were able to vary our procedure according to the results desired (see page 278).

If on leaving in the morning we wished to provide supper against our return, or if we wished simply to keep a pot warm, we would select a "slow" hole; but if we were in a hurry for something, we would put it into a hot place, where it would boil away vigorously.

In the hottest places our food would burn up if left too long, just as when cooked over a fire; but a pot could be left indefinitely in the slow holes without harm.

Once, when driven out by storm, we found the oatmeal that had been put on for breakfast in prime condition on our return two days later. The wind had been so fierce as to bury the pot entirely in drifting pumice, so that it had to be dug out with a spade; but it was none the worse for having simmered away nearly ten times as long as intended.

With no temperature at our command greater than that of ordinary steam, we had been compelled in 1917 to limit our menu to boiled dishes; but the range of temperature at Baked Mountain was great enough to provide any sort of cookery we might desire.

CORN PONE À LA FUMAROLE

The situation of the "cook-stove," which made such varied temperatures readily available in a short compass, was characteristic of many areas in the valley. It was located on the roof of one of the great bridged-over fissures which encircle the margin of the valley. In several places this fissure stood gaping open ten feet wide—a great cleft, narrowing be-

Photograph by R. F. Griggs

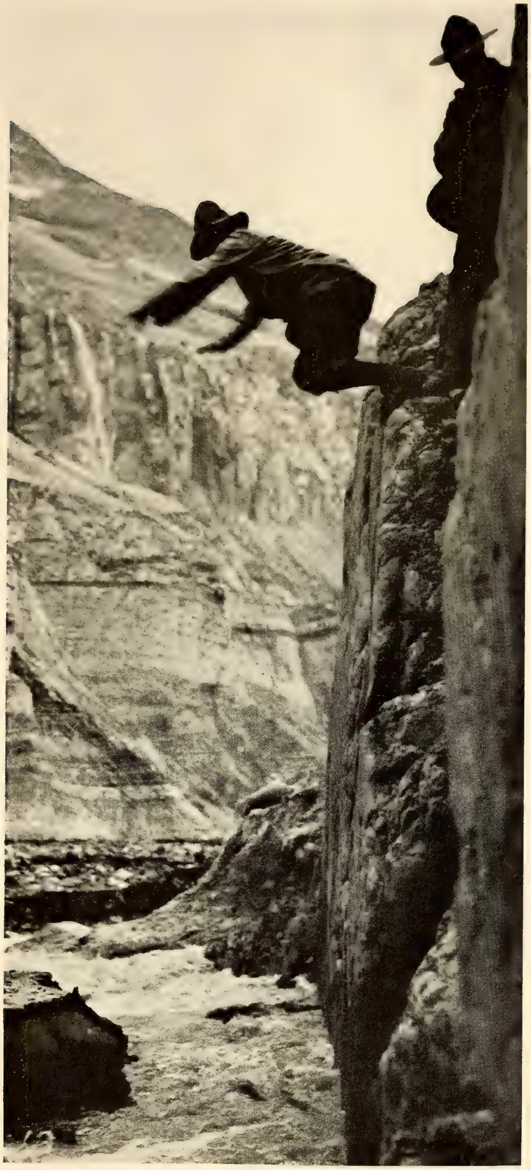
UNLOADING SUPPLIES AT THE HEAD OF NAKNEK LAKE

With power boats it was possible to bring all sorts of heavy freight up as far as the base camp (see text, page 243)

Photograph by J. D. Sayre

THE FIRST PERMANENT BUILDING WITHIN THE BOUNDARIES OF KATMAI NATIONAL MONUMENT

This pioneer structure was built to house the surplus equipment of the National Geographic Society's sixth expedition to the Katmai volcanic region.



Photograph by E. C. Kolb

THE LAST LEAP IN THE DESCENT INTO KATMAI CANYON

The canyon is 4,000 feet deep. The descent is not so difficult or hazardous as might be supposed from this picture. Before taking off, I took good care to see that there was a way back.

low, but reaching down farther than we could see into the depths.

From such openings issued enormous volumes of superheated steam, forming some of the greatest smokes of the valley. For the most part, however, this fissure was not open, but closed by an arched bridge of ash which in some way had been stretched across it, forming a span quite strong enough to support the weight of a large party, although when soaked up by a violent rain it caved in in places, forming new and impressive fumaroles as the hot steam rushed forth from the new outlets thus formed.

The cavern immediately beneath the bridge was, of course, full of highly heated gases pressing up to issue in one of the fumaroles. Under these circumstances every little crevice in the arching bridge was the path for a small seepage of steam, the temperature of which as it emerged depended on the volume.

The slow cookers were dug in places with little seepage; the hot spots had close connection with the steam below. It was not always possible to tell by looking at a hole how effective it would prove as a cooker, for there was little visible emanation from any of those we used.

BACON FRIED IN STEAM

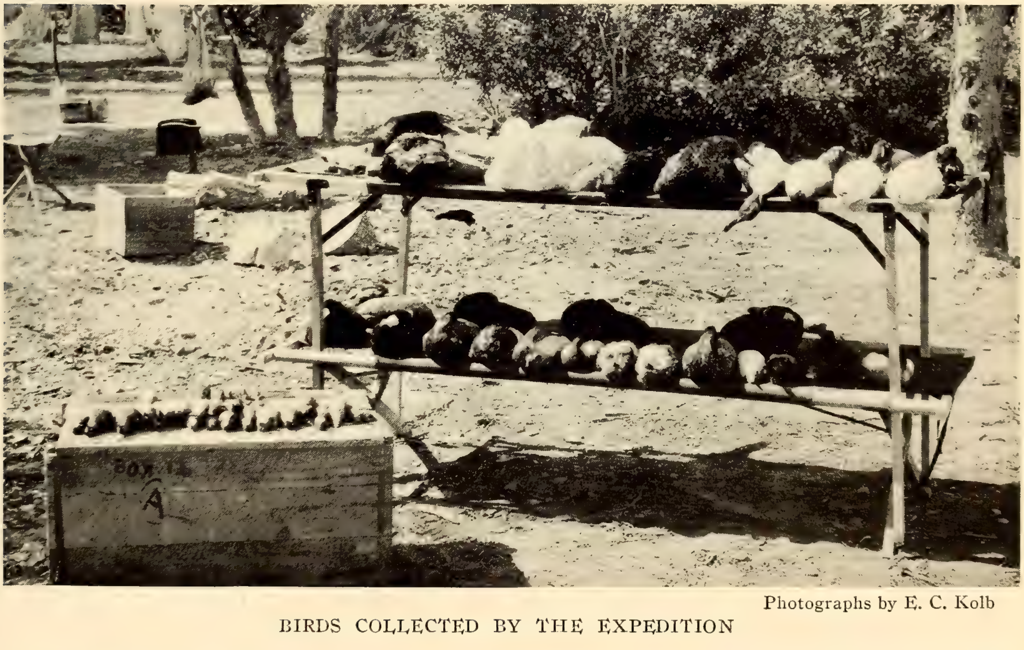
In the hottest of our "stove-holes" the temperature was high enough to fry bacon or bake bread with ease. For some reason, the tastes of the party centered on johnny-cake rather than on white bread or biscuits, although the latter were occasionally made with equal success. The procedure was to put the batter inside one of the covered aluminum cooking pots, which was then simply set on the ground in the proper place and allowed to bake.

Baking over the fumarole requires somewhat the same sort of skill as it does anywhere. It would not do to go off and forget the corn bread, as we did the oatmeal; for if it was left longer than the allotted hour, it was burned up, just as it would have been in any other oven; but when taken off at just the right time, it came out with beautiful, crispy brown crust, as fine corn bread as was ever seen anywhere (see page 273).

For frying bacon we found it most convenient to repair to "Fumarole No. 5," at a little distance from the camp. Here a column of very hot steam came

EAGLETS IN THEIR NEST AT THE ENTRANCE TO GEOGRAPHIC HARBOR

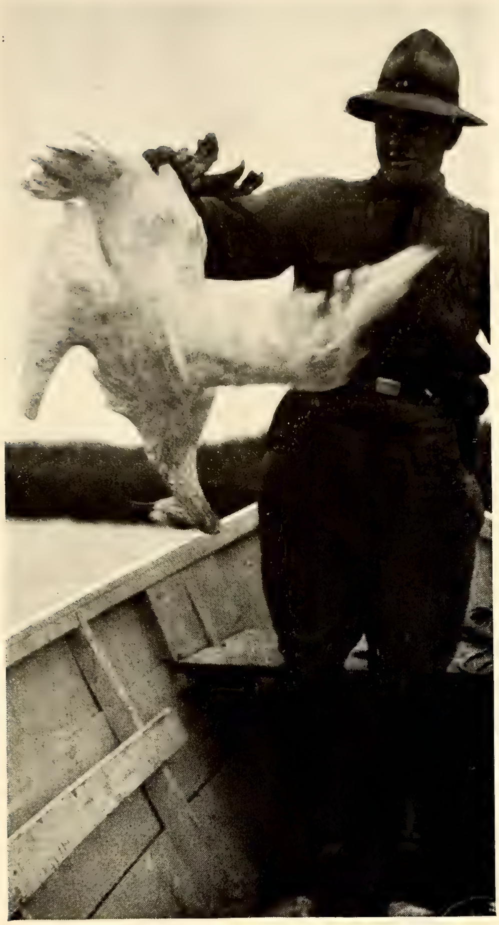
This nest was built in the top of the tree shown at the right on page 282.



Photographs by E. C. Kolb

BIRDS COLLECTED BY THE EXPEDITION

The birds of the lake country (see illustrations, pages 284, 286, and 288) are quite different from those of the Pacific Slope. Among them were some familiar friends, such as robins like those of the Eastern States.



Photograph by J. D. Sayre

A WILD SWAN CAPTURED ALIVE BY MILLER

Being at the height of its molt, it was unable to fly, and so was easily overtaken and captured by the power dory. It made such a disturbance with its great white wings that the captor was glad to let it go.

out, under considerable pressure, from a round hole about a foot and a half in diameter, in such a way that it could be readily approached.

The emerging gas from this place was so hot and came out with such a rush that when we tried to pour a cup of water into the hole it never reached the ground, but was caught up by the outrushing steam and carried away before our eyes, vaporizing within a few inches. When we threw our hats into it they would go sailing away thirty feet into the air before coming down again.

The fry-pan had to be held *down* against the steam. Even the weight of the long stick we employed as a handle was not sufficient to balance the pressure of the fumarole, for it would keep wobbling around, up and down, in and out of the rushing steam unless firmly held. Needless to say, the bacon began to sizzle promptly and was soon as well crisped as when cooked over the best of camp-fires.

While experimenting to find the best place to hold the pan, we tried pushing it down into the cavern below the orifice; but no sooner had the fry-pan passed below the surface than—piff—the bacon was whisked out of the pan and went flying in every direction through the air, to be eagerly caught and devoured by the waiting spectators, who howled with delight at this sudden turn of events, which, after being discovered accidentally, was repeated again and again, until we tired of chasing the flying slices (see p. 236).

With such facilities at our command and a full stock of dehydrated fruits and vegetables, there was little in the way of "grub" that could not be supplied at Baked Mountain whenever occasion demanded.

The staples were oatmeal, rice, beans, corn-bread, dehydrated potatoes, with abundant butter, cheese, and pilot-bread. These were varied with an occasional mess of corn-beef hash, or of trout when some one brought them up from the lake. For green vegetables there were string-beans, spinach, and "boiled dinner vegetables," the latter soon becoming a joke because of the superabundance of carrot, of which every one quickly tired.

Our fruits included apples, raisins, peaches, pears, apricots, loganberries, cranberries, and cherries, the last being such a universal favorite that they were soon used up. One hot day we even indulged in iced tea, but for the most part we preferred hot dishes.

A DOUBLE-ENDED FUNNEL FOR STORMS

All went well at Baked Mountain camp as long as the weather remained good, but when the storms struck we encountered a fury that no tents could withstand. Katmai Pass, which stands at the head of the valley, has always had the unsavory reputation of being one of the windiest places in the whole world. The conformation of the mountains is such that the pass is a double-ended funnel, through which the wind sucks with terrific violence, whichever way it blows.

Curiously enough, it is not on the windward, but on the lee side of the pass where the heavy "williwaws," or "woolies," as the boys called them, are experienced. Thus, while the northwest winds are unendurable on the Pacific side of the pass, it is the northeasters that are dreaded on the valley side.

We were blown out four times before we finally learned our lesson and moved camp to a safer, if less convenient, location. Fortunately, these storms came in a series of increasing violence, so that each time we were better shored up against trouble than before; otherwise they would have been even more disastrous than they were.

ATTEMPTS TO OBSERVE THE CRATER OF MT. MARTIN

One of the plans, which stood first among the intended projects of the expedition, was the exploration of Mt. Martin. This volcano, the existence of which was first made known by the expedition of 1915, being much the most active vent in the whole district, challenged our interest from the first. But it had always stood as a sort of hoodoo which had resisted our efforts (see pages 248-249).

As it is located in the most inaccessible part of the range, to get within striking distance was somewhat of a problem in itself. Moreover, it is so placed that it is the last peak to clear up and the first to cloud over in bad weather. Worse yet, the very strong updraft created by the ascent of its tremendous column of steam sucks up from the lowlands a body of warm air whose moisture promptly condenses into dense clouds when it reaches the heights.

Thus, while it is frequently clear for a little while morning and evening, it is often swathed in clouds during the middle of the day. One very often starts out in the morning with the best of prospects, only to find his labor wasted when he scales the heights.

Knowing something of these difficulties in advance, we planned to make the ascent early in June, when the weather is the most favorable. But here again we were balked, for we found that the snow persists longer around the head of Martin Creek than anywhere else in the district, so concealing those features whose study was our object that a climb at that season would have been fruitless.

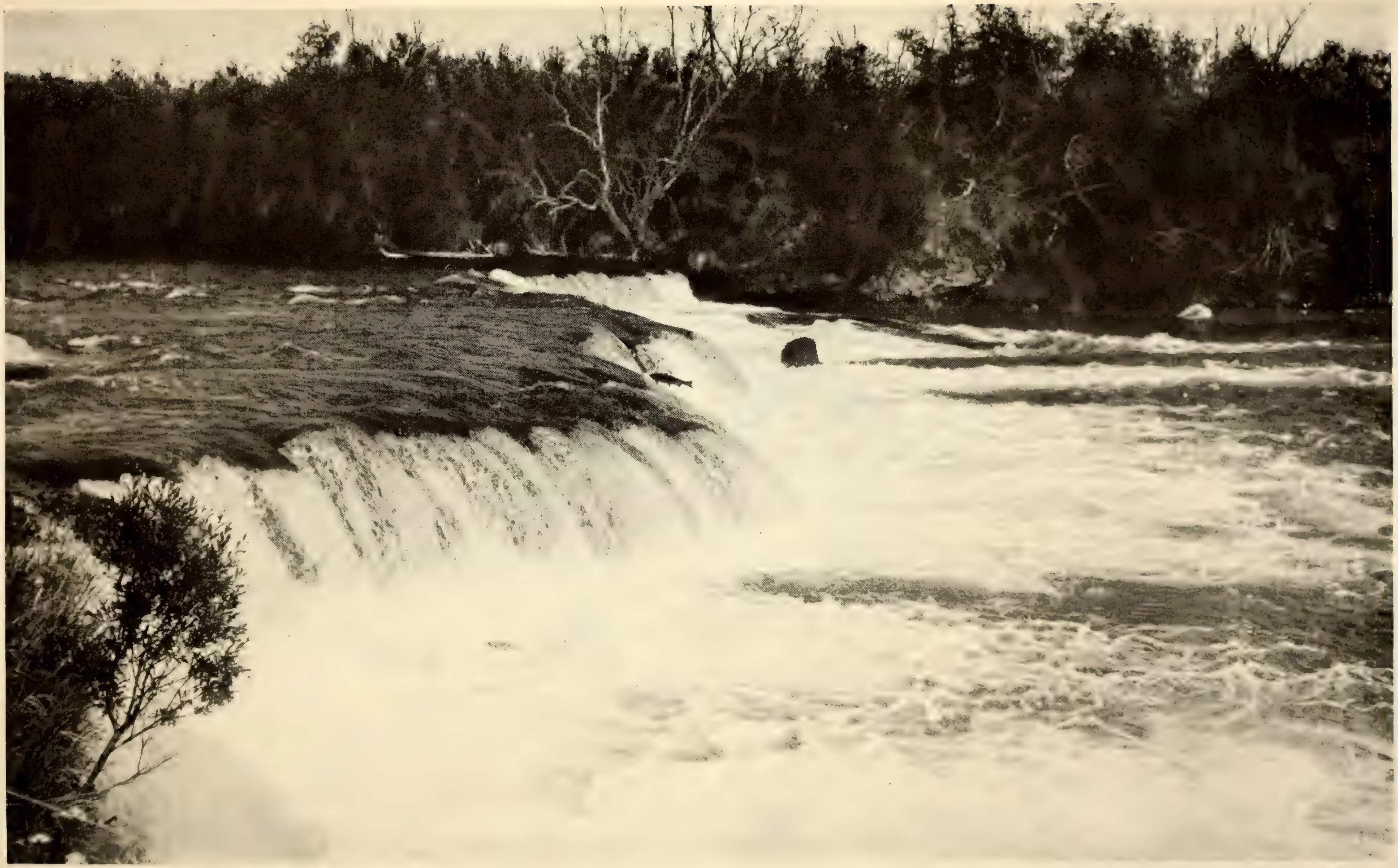
Photograph by W. L. Henning

GIANT RAINBOW TROUT FROM NAKNEK RIVER

The fishing is such as would make Izaak Walton turn green with envy. We never had to cast more than once or twice before we had a strike that kept us busy. The trout average about 24 inches long, but some are much larger. Our largest catch measured a full 32 inches (see page 290).

WITHIN A FEW MINUTES OF SUCCESS

Accordingly, it was not until August that we camped at its foot, waiting for a chance. The crater was clear early in the morning of the first day after my ar-



Photograph by E. C. Kolb

LEAPING SALMON ASCENDING THE FALLS TO SPAWN IN LAKE BROOKS

It was hard to catch them in still pictures. The motion-picture films sometimes show six in the air at once. After careful count, we estimated that these salmon were ascending at the rate of 1,200 an hour (see page 287).

rival, and so up I started, without waiting for Hagelbarger and Henning, who were to meet me; but before I had gone far it commenced to rain so hard that, though I could still see the volcano, it was of no use to try to take pictures. Nevertheless, the day was not wasted, for I was enabled to pick out the best route to the summit and to study the general situation of the mountain.

On the second attempt to climb, clouds settled down on us at the 3,500-foot level; but, thanks to bearings secured the first time, we were able to continue on across the glacier, through the obscurity, for another hour, in hope of a break that would permit us to scale the summit.

Finally, having gone as far as we dared beyond the previous observations and reached the main divide of the range, we sat down and ate our lunch, hoping in vain for a rift in the clouds that would permit us to get new bearings.

Later we found we were directly under the last steep pitch of the cone, and if we had only known the way could have climbed on to the rim in a few minutes more. But it would have been an empty stunt to have reached the top under such conditions, for we could have seen nothing when we got there.

It was a mournful "bunch" that descended the mountain that evening, for the demands of other work were imperative and camp had to be broken next day, with the crater yet unseen after two weeks of waiting for a chance to climb.

CLIMBING MARTIN FROM THE WRONG SIDE

Five days later, as I lay awake at Baked Mountain camp, I crawled out into the night to look at the valley and the volcanoes in the spectral light of a wonderful full moon. There was Martin puffing away, beautifully clear, its unconquered steam column rising majestically over all. Why not do it tomorrow? (see p. 220).

We were now on the wrong side of the range and so far from a favorable starting point that it was uncertain whether we could make it; but it was the only chance, for there were unmistakable signs that the good weather that had favored us for two days was about to change.

It meant covering a mile in altitude and 30 miles in distance; but I was not to be turned back if there was any possible way of getting there, and I knew Charlie Yori was as anxious as I to try it. Indeed, I should never have dared attempt to cross the glaciers that guard it on the valley side without his guidance.

So I waited until a decent time to rouse the camp, and then interceded with Dr. Allen, for Charlie was his man, for his release that day. This was readily obtained, for the chemists needed to pause in their field-work and rig up some new apparatus anyway. So Fenner and I got ready in a hurry and started off with Yori double quick, in our eagerness to get to the top before anything should happen.

The whole of the course after the first slope lay across glaciers and snow-fields. For the most part, going was not difficult, except that we had to waste much time winding in and out around the irregularities of the ash-covered glaciers—here following a drainage gully, there cutting across the ridges.

But before we reached the high snow-fields that surround the summit, we had to cross an area all cut up by close-set crevasses. As we entered this, Yori remarked, "This is a real glacier, all right enough."

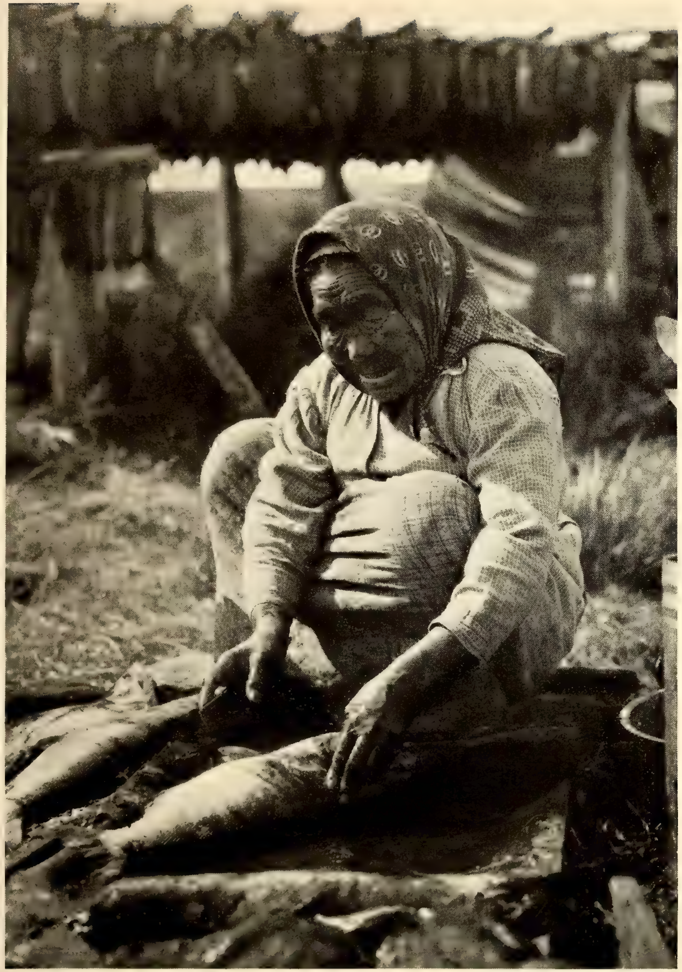
With his customary hardihood, he professed to scorn a rope and took a sort of fiendish glee in trying me out in the most "ticklish" places he could find.

I will not deny that I was somewhat skittish, for my hob-nailed boots were worn out and I had been compelled to come in rubber-soled shoe-packs which could get no grip on the slippery surface—a fact that bothered me greatly, though the ice-axe which I carried probably counterbalanced the disadvantage.

Our way lay, as Fenner expressed it, "along the ridge-pole," following narrow crests, themselves sloping both ways, between bottomless crevasses on each side. Any slip would have meant certain death, and that glaring blue ice was deucedly slippery; but we crept along, using all the care we could, and finally reached the névé above without mishap.

AT THE EDGE OF THE CRATER RIM

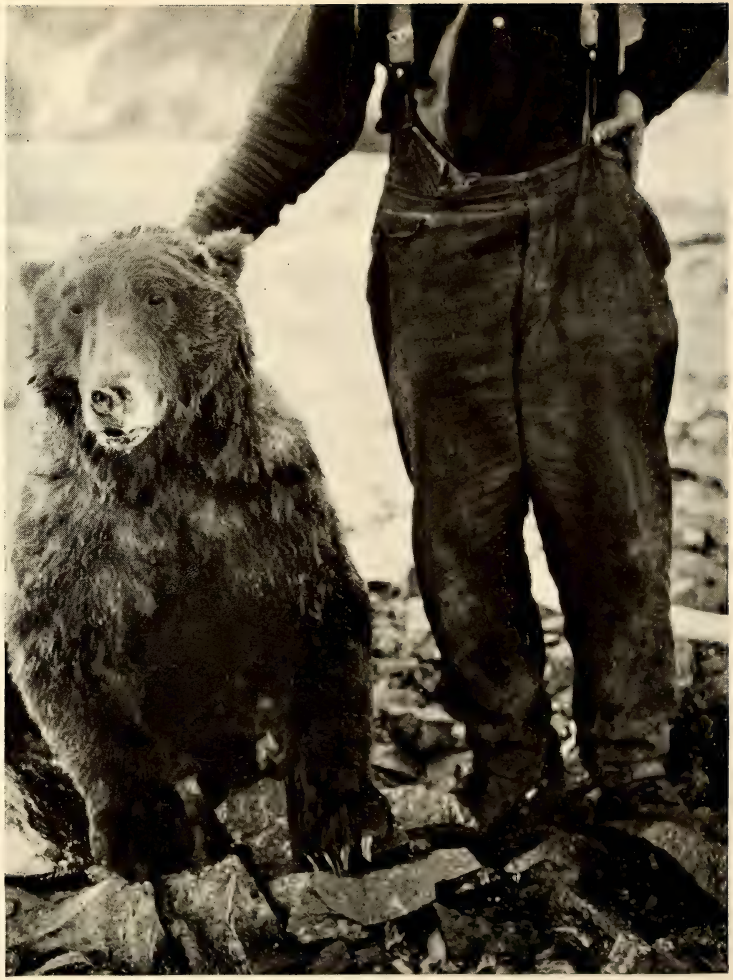
Without stopping for the pictures we so much desired, we pressed forward feverishly in our anxiety to reach the



Photograph by E. C. Kolb

ESKIMO WOMAN DRESSING SALMON: NAKNEK

This woman was away from the village at the time the "flu" struck; otherwise she probably would have died, for the epidemic carried off practically every adult native in the whole Bristol Bay country.



Photograph by W. L. Henning

A YOUNG BEAR SHOT IN GEOGRAPHIC HARBOR

While he was swimming from island to island, he was overtaken by our gas boat, appropriately named the *Nimrod*, which gave chase and easily captured him.

summit while it was yet clear. A breeze had sprung up out of the northeast and we knew it was only a question of time before our mountain would be hidden in the clouds. Indeed, they had begun to gather already.

We made rapid progress now, over the smooth snow-field, circling the base of the cone, for the low point in the crater rim lay on the side opposite to our approach. We were in the clouds now, but had a glimpse out across the range to the Pacific.

When we came around under the low notch in the rim, we sat down and waited for a break in the clouds to get our bearings before taking the last steep slope, eating our lunch as we waited.

Hardly more than a hundred yards away was the hillock where we had stopped on our attempt from the opposite side. This time, however, we never doubted but that we should soon have our chance, for the clouds were only beginning to gather. Indeed, we had hardly begun to eat when they blew off a little.

There was the crater rim, seemingly only a few steps directly above us. Great masses of steam came rolling up close against it, but as we were on the windward side they were quickly carried off in the opposite direction.

From a distance the smoke of Martin always appears snow white, but from our position it took on a weird lemon-yellow color, which Dr. Fenner suggested must be due to reflection from a large body of sulphur within the crater.

The rim seemed so close that, dropping my cracker, I started for it, but before I could go a dozen steps the clouds closed in again. But we had our bearings now. As soon as we had finished our lunch we started up, so as to be on the rim when the next break came.

That last pitch, 250 feet it proved when we climbed it, was the steepest slope I have ever attempted. If it had been rock climbing, it would have been easy; but it was boulder clay left there by a glacier which had capped the mountain during its dormant period.

The slope was 60° by the clinometer (as compared with about 30° in a steep railroad embankment). The round boulders on which we depended for foot- and hand-holds were loosely held in the uncemented clay, so that it was extremely difficult to hang on.

Finally we reached the rim at 5,300 feet, but were unable to see anything in the cloud and steam that beset us. Inside the first sharp edge we found a slight depression, and then a second similar sharp inner rim. The original rim had evidently broken loose and slumped into the hole a little.

In the depression between the two rims was a little pool, over which we bent to secure a drink, for we had only snow with our lunch; but—ugh! it was strong acid. The fumes at the rim were disagreeable, and I was glad to retreat into a little hollow, where I could take notes in comparative comfort.

DESCENDING INTO THE CRATER OF MT. MARTIN

After a little, Fenner came back out of the cloud and reported that if we used our handkerchiefs for respirators we could go down inside the crater. So we all held our handkerchiefs to our noses and plunged over the edge.

On the rim we could see readily 50 feet through the cloud, but once inside it thickened rapidly until, only a few feet below the rim, we could hardly see each other, though standing close together.

Whenever a gust of wind swept the smoke back a few feet, we leaped on farther down until the obscurity closed over us again, and we were compelled to halt for fear of stepping off the edge of the precipice into the vent that we knew must be at the bottom of the funnel.

There we stood huddled together, like ninnies, panting through our handkerchiefs and pulling down our hats in futile efforts to protect our smarting eyes. If we loosened our handkerchiefs a little to get a freer breath, we got a suffocating draft that at once compelled us to clamp the protection back again.

Silent as ghosts we stood until one of us, caught by the ridiculous attitudes of his companions, burst out laughing, setting us all a-snickering behind our handkerchiefs like school-boys who fear the teacher's wrath, for we durst not lift our handkerchiefs to let in the fumes.

Thus we stood for nearly half an hour, but there came no further opportunity to proceed. As we could see nothing around us, we were compelled to give it up, and after picking up a few of the rocks immediately around us, which were ordinary andesite, scrambled back to the rim.

Here again we sat down and waited for an hour, but as there was not the slightest sign of a let-up we had to give up and start back. The momentary break that came while we were eating was the only near-by view of the crater we were to have.

Climbing up a slope of boulder clay at an angle of 60° is as nothing compared to wriggling down again. There was imminent danger of dislodging loose boulders on our companions below, and there were places where we simply had to let go and fall off, trusting to luck not to hit anything hard before we could stop.

When we reached the snow-fields again, we soon saw that the cloud cap was much thicker than when we had ascended, for we had to descend many hundred feet before we came out into clear day again.

We had not turned back a minute too soon. We needed no second hint. We all knew that to have been caught in a fog on that crevassed glacier, where we could neither follow the route by which we had come nor choose a new path that would take us across in safety, might mean disaster.

A PERILOUS TRIP ACROSS ROTTEN SNOW-BRIDGES

As we wormed our way in and out around the crevasses, we got into an area of snow-bridges at which Charlie, with his long experience with glaciers, hesitated. He kept protesting that he "didn't like that ice," and we went forward with great caution; but no better way was to be found and the certain menace of the thickening clouds compelled us to take the lesser risks of rotten snow-bridges and go ahead regardless of danger.

All's well that ends well, however. At length we passed the last crevasse and finally reached the solid floor of the valley again without accident.

It was a long drag across to camp, but we made it before half past eight, tired and disappointed, yet with the knowledge that we had succeeded in a difficult venture, even if we had been denied the fruits of our labors. And this, the 16th of August, had been the best opportunity to climb Mt. Martin since the 25th of July!

THE DESTRUCTION OF BAKED MOUNTAIN CAMP

As we came across the valley on our way back, the northeast wind freshened in a way which I knew meant that the "woolies" were to visit us that night. We were too tired from our climb to care much, however, for we knew we could sleep through anything, and the tents had been so shored up, as a result of previous experience, that, like the skipper of the *Hesperus,* we believed they "could weather the stiffest gale that ever wind did blow."

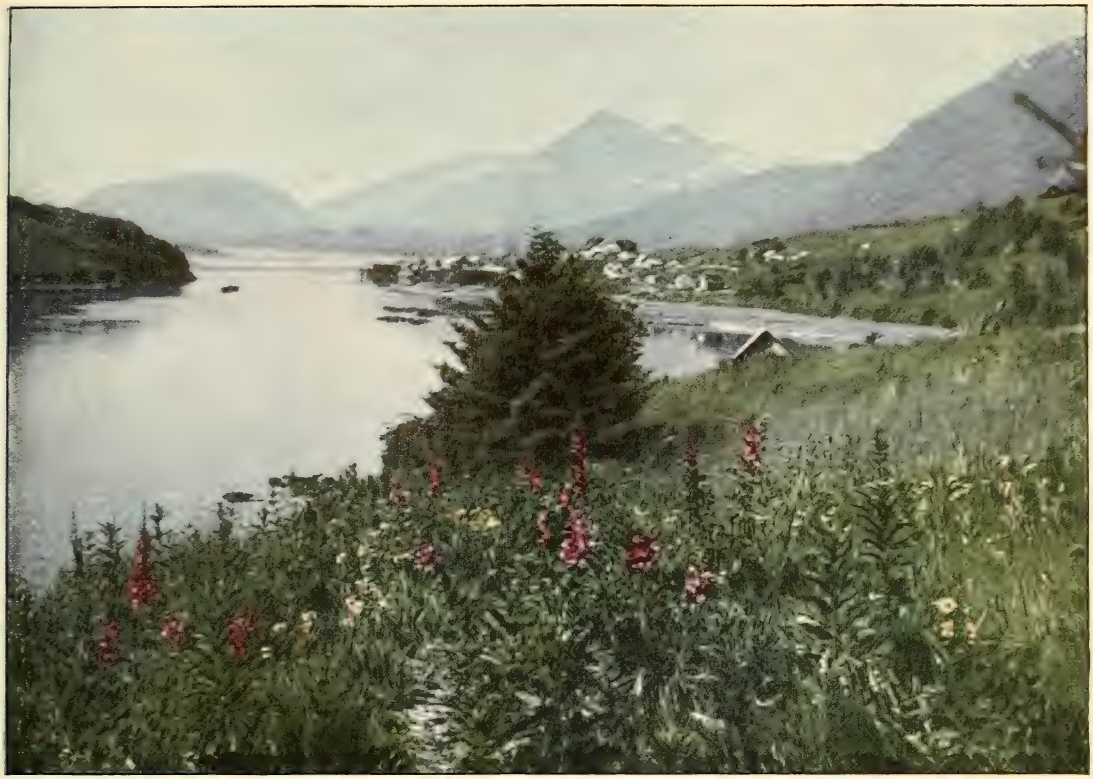
The frame of the grub tent had been strengthened by a multiplicity of poles and braces sunk deep in the ground until it formed a veritable cage, inside which parts of four tents had been patched together. Fully a thousand feet of rope and cord had been used in lashing the structure together. All the guys were anchored to boulders as big as a man could roll, deeply buried in the ground. On every side except the front there were at least two thicknesses of cloth to protect us from flying pumice.

A heavy canvas tarpaulin had been thrown over the second tent and buried in the ground on the windward side to reduce the resistance to the wind and prevent it from getting in under the eaves.

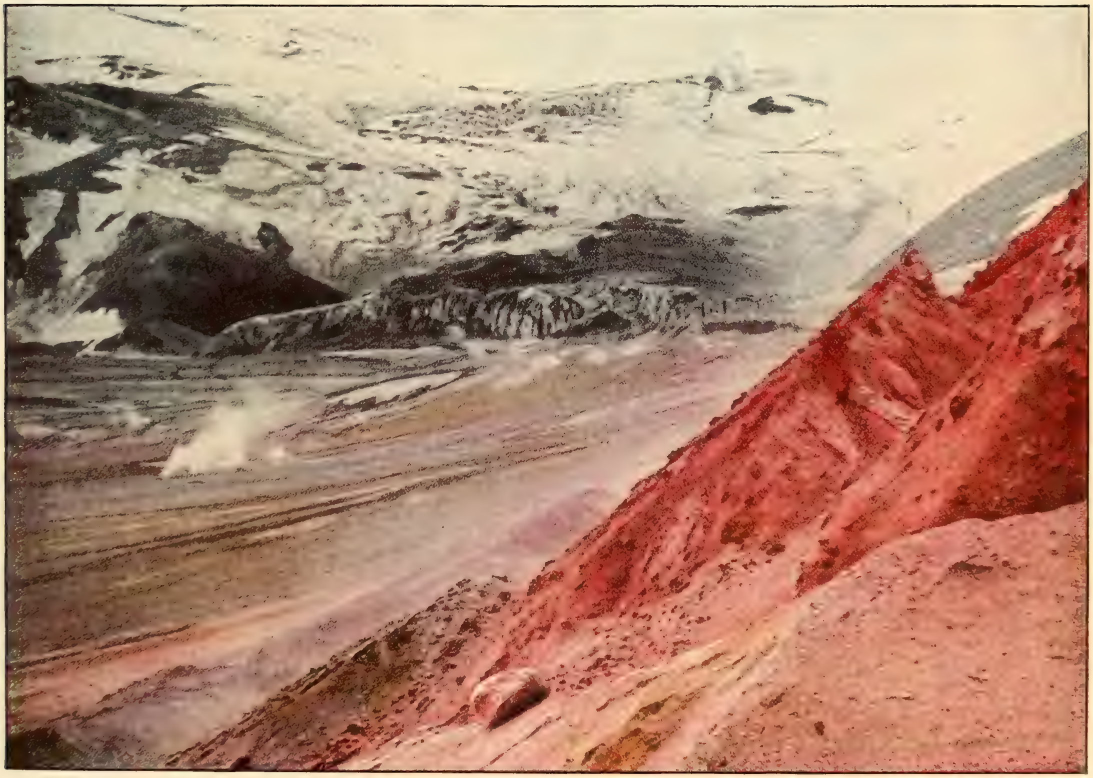
After the first few warning blasts I called to Yori, questioning whether we had not best take measures to protect the camp; but he let out a whoop of defiance—"Oh, let it blow; we can stand it."

I was too tired to get up and go out looking for trouble, so I lay down again to get the rest I so much wanted after the hard climb of the day. If I had gone out then, I could have saved the apparatus tent, which was afterwards sorely needed. But weariness is a great foe to will power, and so I missed my chance.

By the time it was fairly dark the storm had increased to considerable proportions. It came in great intermittent gusts, with intervals of quiet between

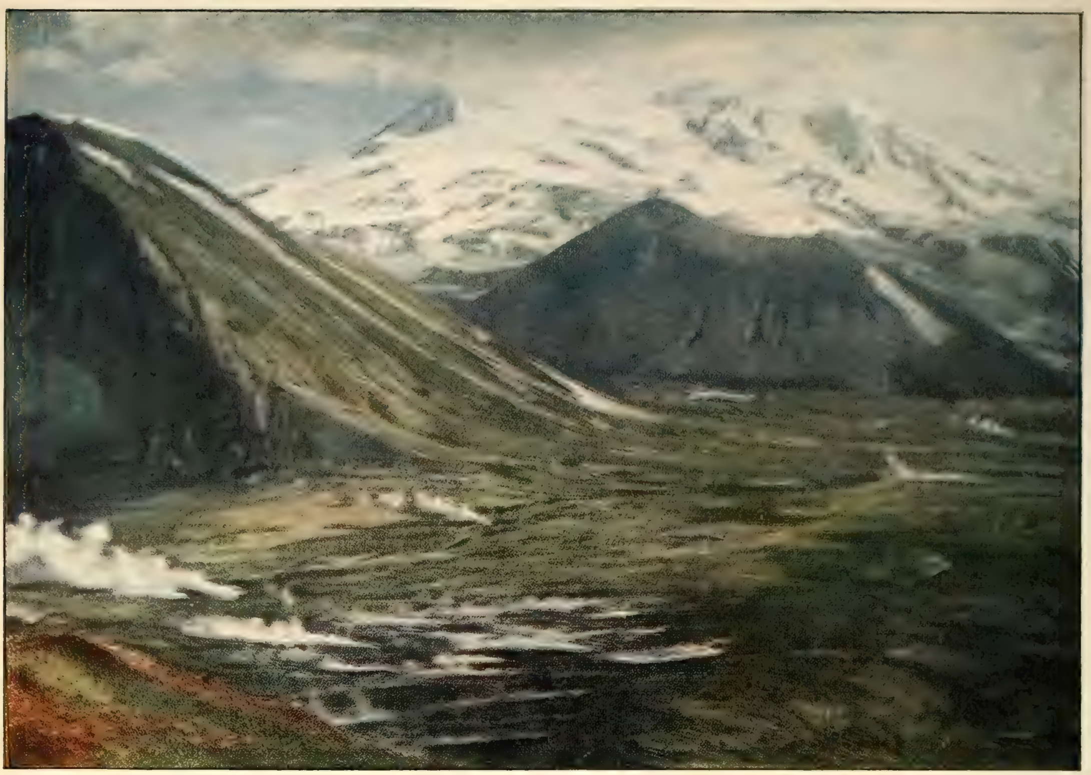


THE COMPLETE RECOVERY OF KODIAK FROM BURIAL UNDER A FOOT OF ASH—

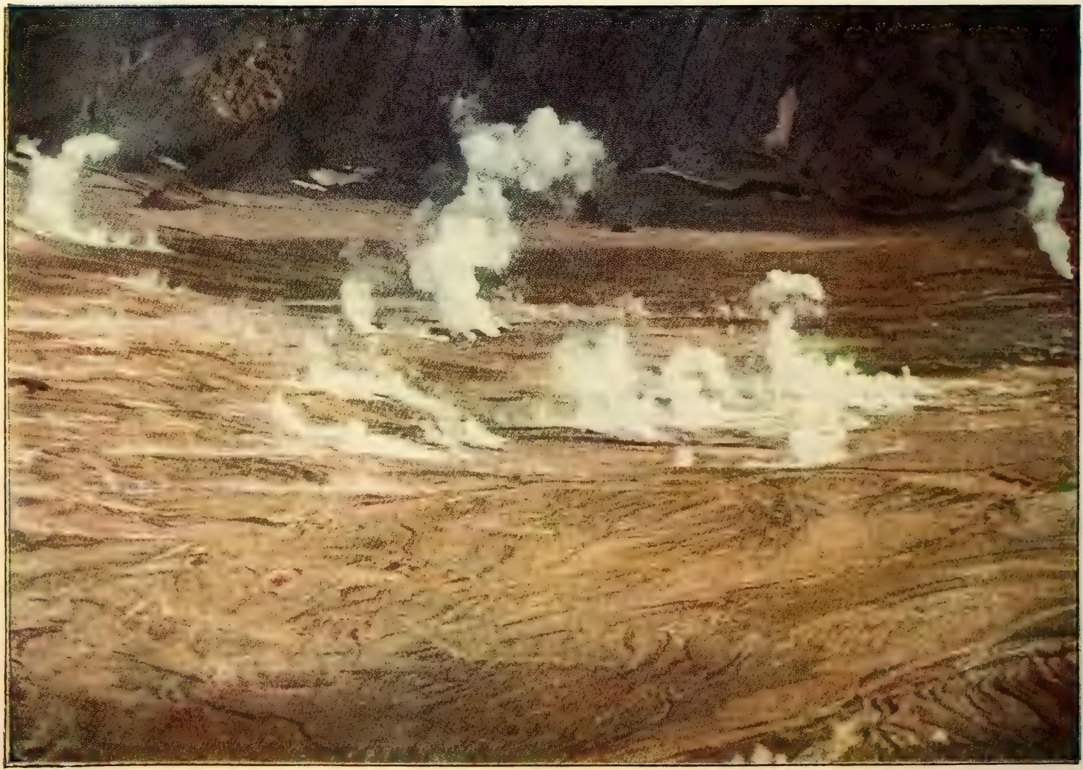


Natural Color Photographs by Frank I. Jones

—CONTRASTED WITH THE ONCE GREEN VALLEY OF SMOKES WHERE EVERYTHING WAS CONSUMED BY FIRE



MOUNT CERBERUS KEEPS GUARD AT THE HEAD OF THE VALLEY



Natural Color Photographs by Frank I. Jones

FUMAROLES AT THE FOOT OF FALLING MOUNTAIN

THE OVEN WHERE CORN BREAD WAS BAKED BY NATURE'S FIRES

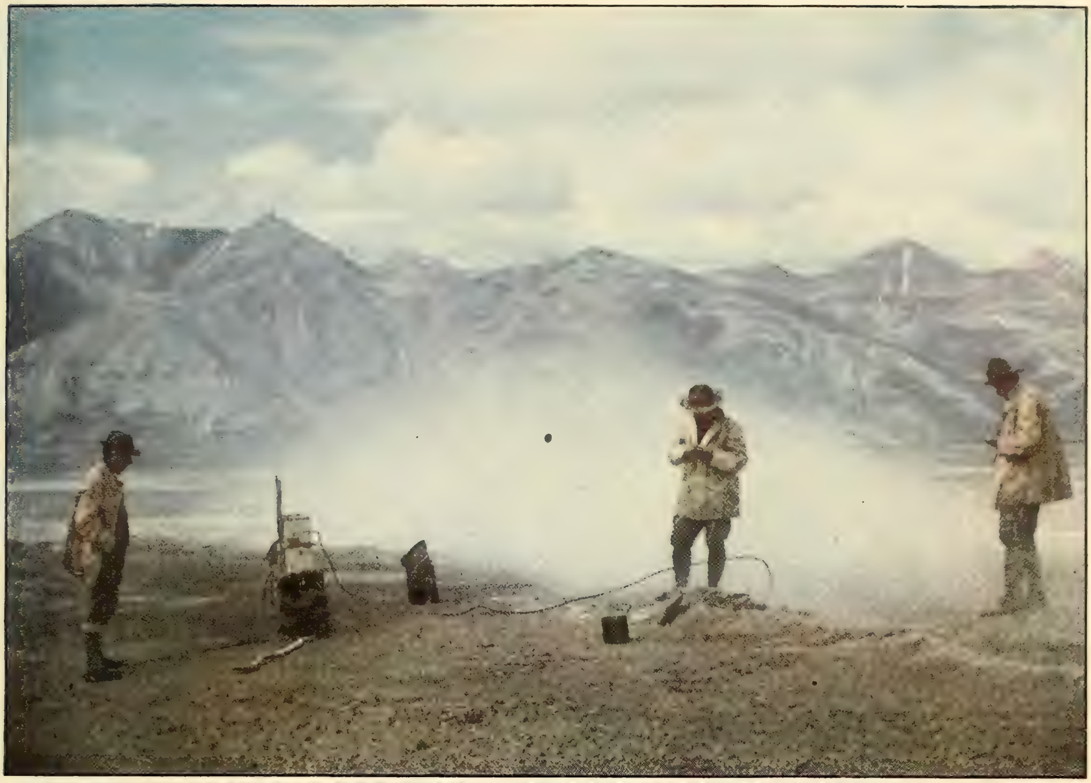
Natural Color Photographs by Frank I. Jones

MULTICOLORED INCRUSTATIONS GATHERED AROUND THE FUMAROLES

PEACEFUL FOREST AND PELLUCID LAKES WITHIN A DOZEN MILES OF THE SMOKES

Natural Color Photographs by Frank I. Jones

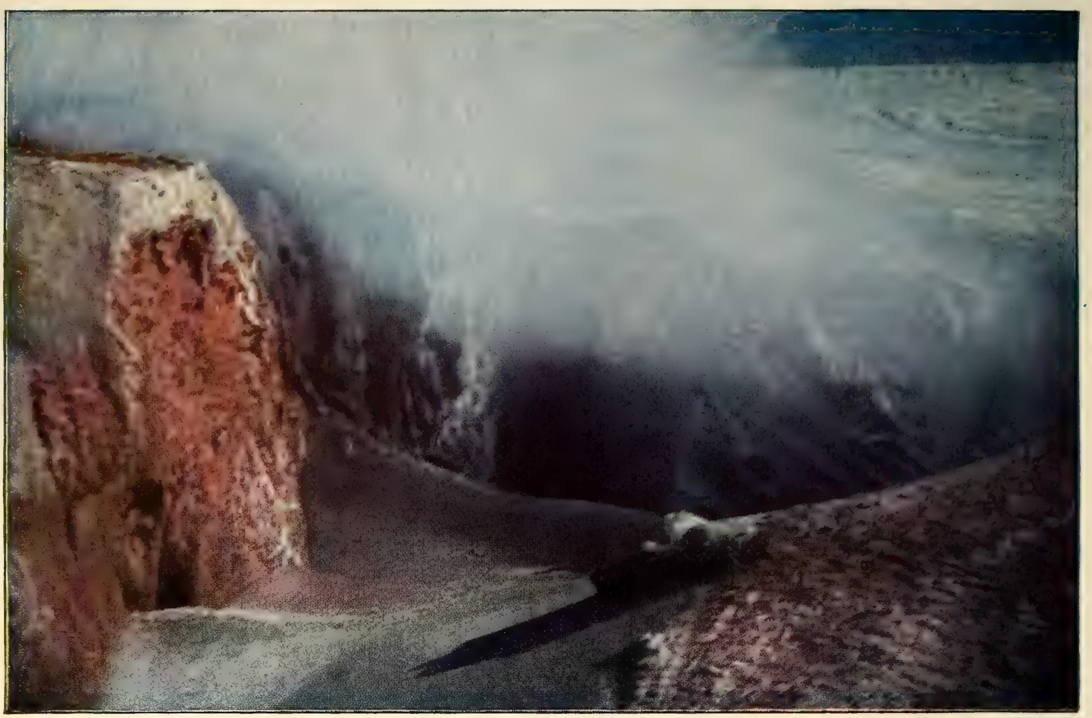
THE VARIHUED DEPOSITS RESEMBLE BRILLIANT MOSAICS



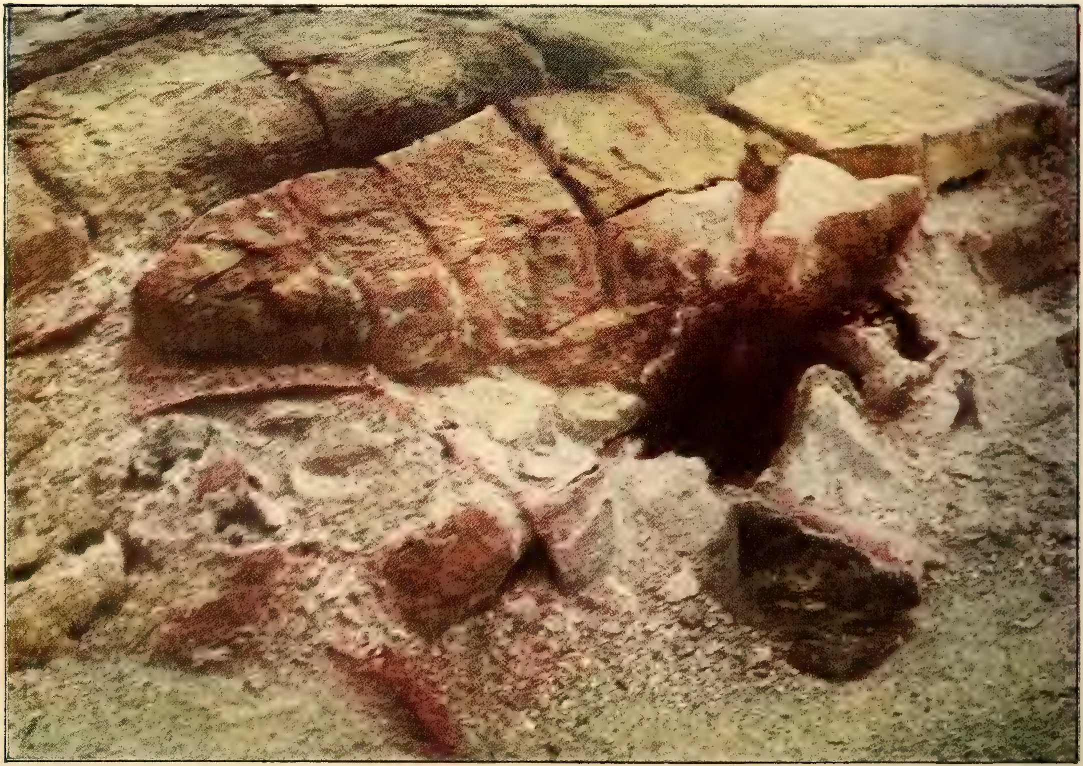
TAKING THE TEMPERATURE OF MOTHER EARTH

Natural Color Photographs by Frank I. Jones

THE GAUDY MUDS OF THE VALLEY MAKE GOOD PIGMENTS FOR A PAINTER

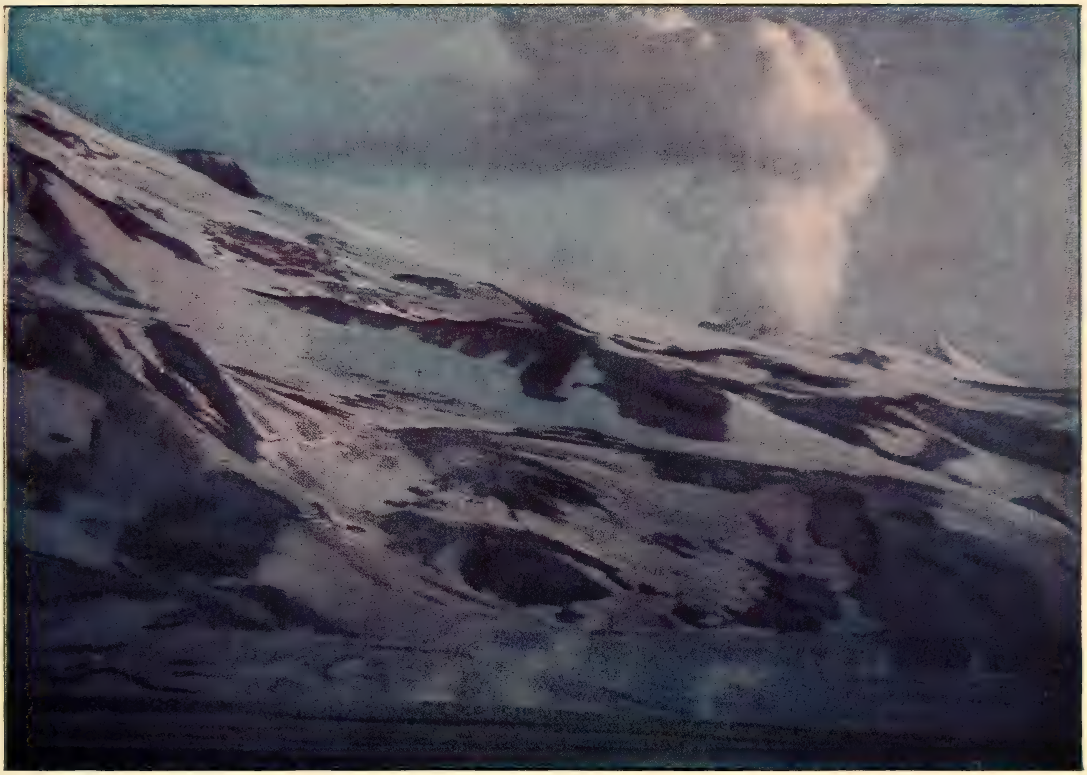


THE CAVERNOUS BIRTHPLACE OF ONE OF THE SMOKES

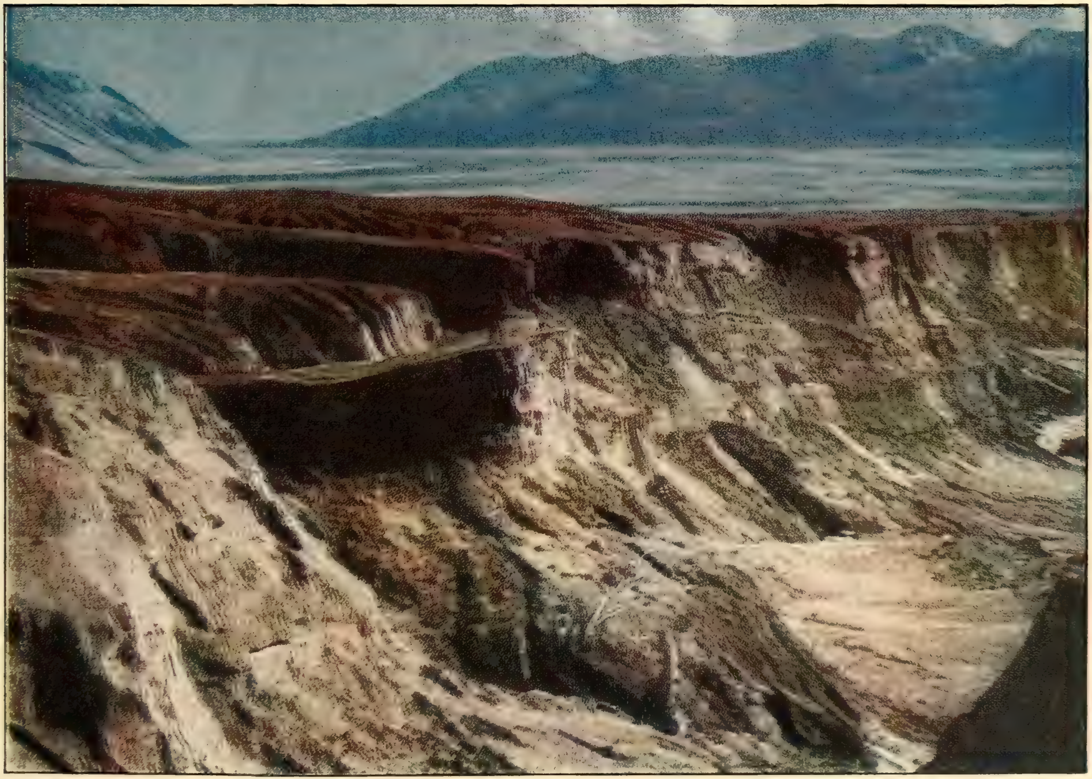


Natural Color Photographs by Frank I. Jones

HARD-BAKED CRUST AROUND A SMALL FUMAROLE

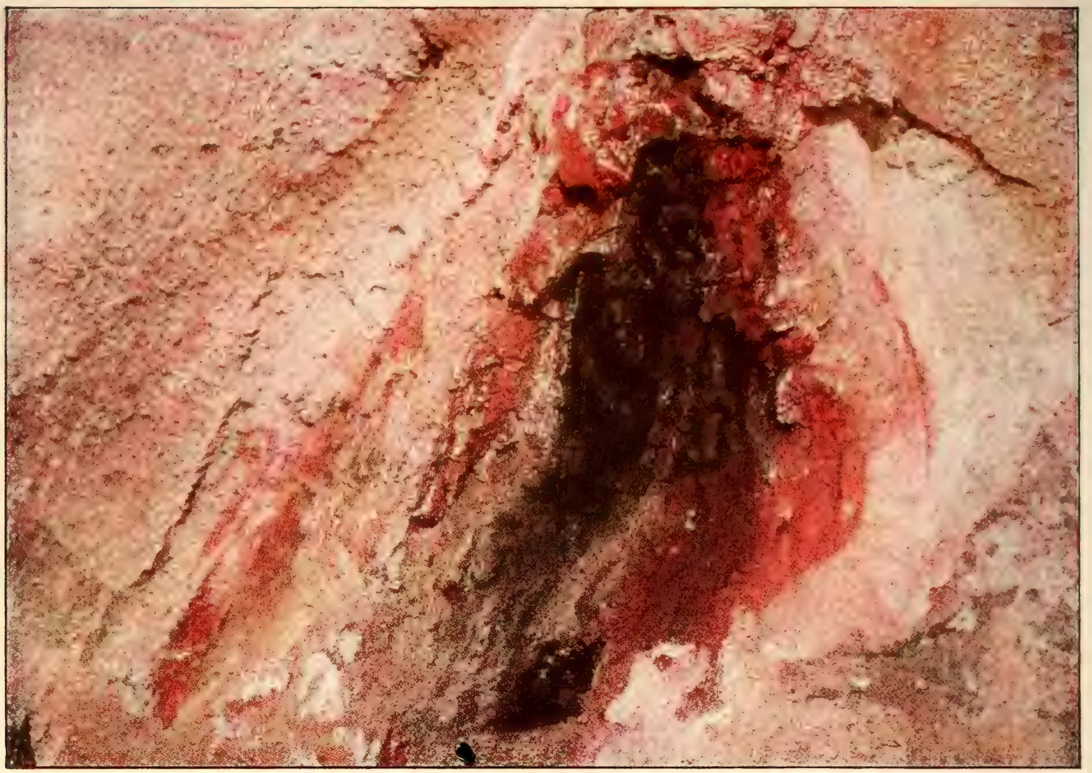


ALPINE GLOW ON A GLACIER-GIRT VOLCANO AT THE HEAD OF THE VALLEY

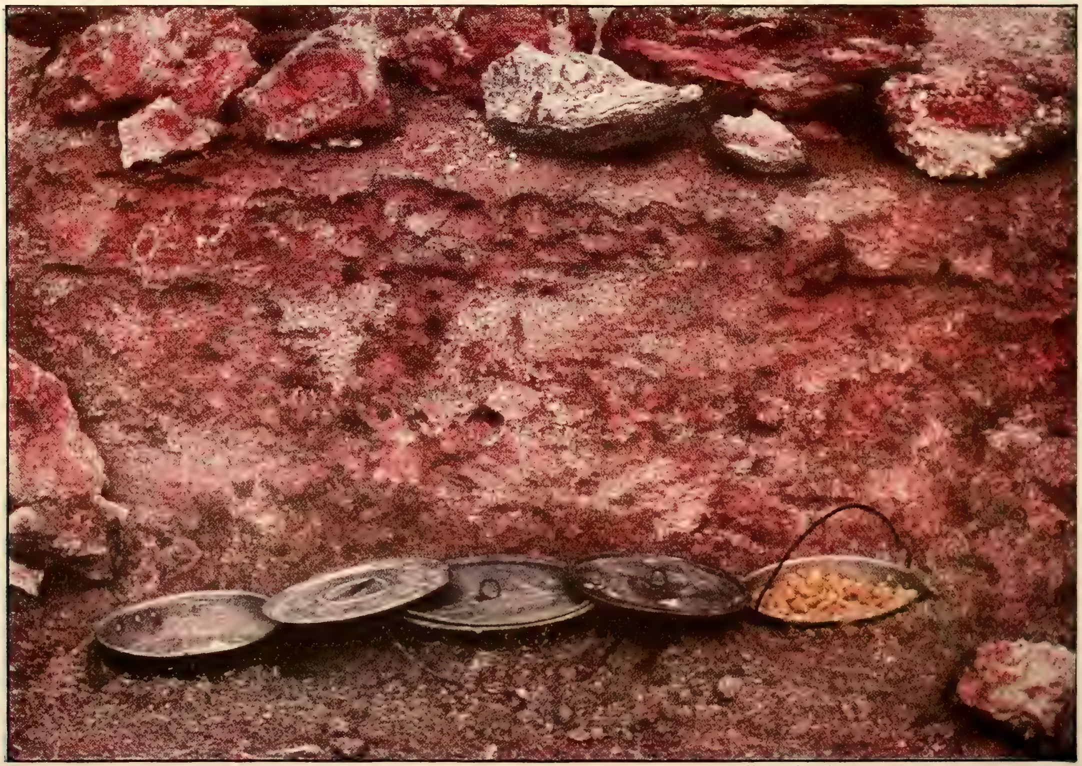


Natural Color Photographs by Frank I. Jones

A CANYON IN THE MUDFLOW AT THE HEAD OF KATMAI VALLEY



THE INTERIOR OF A FUMAROLE LAID BARE



Natural Color Photographs by Frank I. Jones

RICE AND BEANS COOKING IN A GORGEOUS VOLCANIC STOVE them. We could hear them coming over the mountains long before they reached us. Their frightful roar, as they tore their way down through the pass, was for a while more terrifying than the blow when it struck us, as we lay huddled together beneath the tent, wondering what would go next.

The apparatus tent went first, torn to shreds, exposing all the chemists' instruments as well as cameras and other valuable equipment to the soaking rain and driving pumice, which flew before the wind in sheets. By 10 o'clock the poles of our tent snapped, the broken ends tearing great rents in the fabric as they went down. Fortunately, the poles went one by one, so as to give us time to move our beds and duffle into the grub tent, which now alone remained standing.

When the last blanket was removed we managed to lay the wreck down and weight it with rocks, to prevent it from being all torn to pieces. It was all we could do to accomplish this, for by this time the fury of the wind was such that one could hardly manage even so small a thing as a prostrate tent, and the hail of flying pumice was impossible to face, even with goggles for protection. We were well repaid for our efforts, however, for the saving of that torn tent was all that made a resumption of the work possible after the storm.

Crawling into the remaining tent, I stretched out in my sleeping-bag to get a little rest, if I could, against the labors of the morrow. But it was not for long that such relaxation was permitted. It soon became a question whether even so strong a tent frame as ours could withstand the pressure.

Before long the spare tent, with which the lee side had been reinforced, gave way and, still holding to the frame by the corners, went flopping around in the wind to increase the general confusion. Two days later, when we returned, we found it, a new tent, torn clear in two!

No sort of rest was longer possible, so I got up and packed my bed with a little clothing inside my pack-sack to keep it dry, and put on all my extra sweaters and coats to keep out the cold of the driving rain. Some of the others, who continued to use their bedding as robes, were less fortunate, for it was extremely difficult to gather things together and keep them dry in the final break-up.

About 1 o'clock the extra tarpaulin lashed to the windward side tore away, leaving only one thin sheet between us and the gale. It did not seem possible that any light cotton fabric could endure the strain that came on that tent. It pulled so that it broke all our boasted guying and was held only by the frame. The pumice came beating against it with the noise of a hailstorm on a tin roof, but the stones were sharp at every corner, not round and smooth like hail.

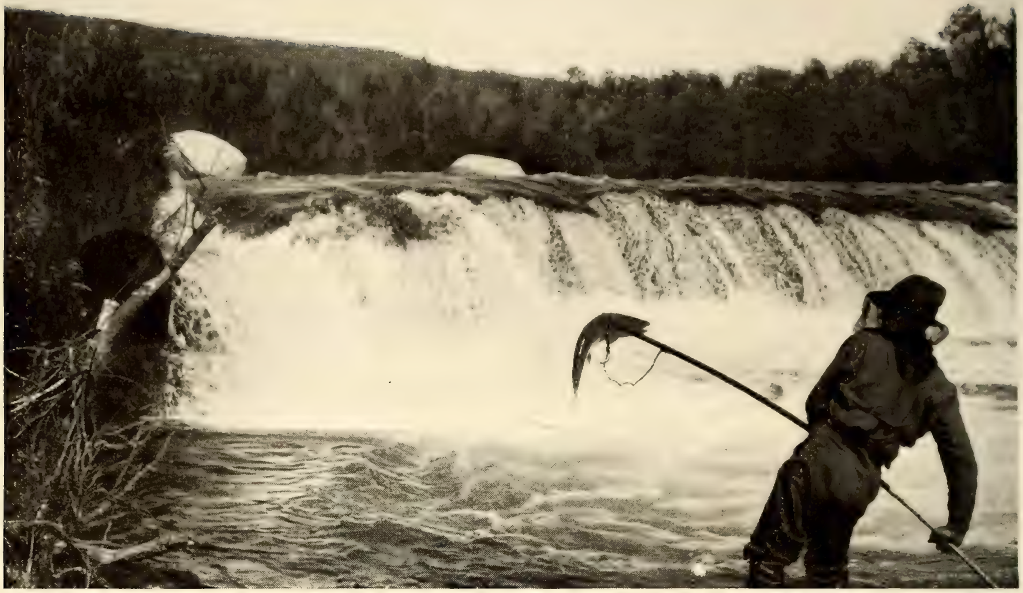
The impact was so heavy that our flesh would not tolerate the pain if, trying to keep the tent in place, we pressed our bare hands or arms against the wall. Why the flying pumice did not instantly cut the tent to shreds was more than we could understand. But it held for half an hour more, and then gave way all at once with the crack of a gigantic whip, as a great rent opened from roof to floor.

A TERRIBLE HAIL OF SHARP PUMICE

The hail of pumice that greeted us as we crawled out to see if anything could be done cannot be imagined. It could not be endured on our flesh for an instant. It hurt clear through our clothing. It drove in around our "dust-proof" goggles, a constant menace to our eyes. Many of the pieces were as large as hickory-nuts and all armed with sharp corners that made them terrible missiles.

Once the tent had ripped, the wet pumice began to collect all over us—in our hair, down our necks, in our pockets, in our ears, in our noses, in our mouths—everything was permeated with it. Soon it was four inches deep on the floor, though more blew on out through the other side of the tent than lodged within.

The five of us—Allen, Zies, Fenner, Yori, and I—huddled against the windward corner, that gave the last little shelter remaining. It was suggested that we crawl into a gully, but I reminded the others that such places were but collecting grounds for the pumice, which would hail down on us in greater quantities than ever; so we agreed to stick it out as long as possible, praying fervently for the dawn.



Photograph by R. F. Griggs

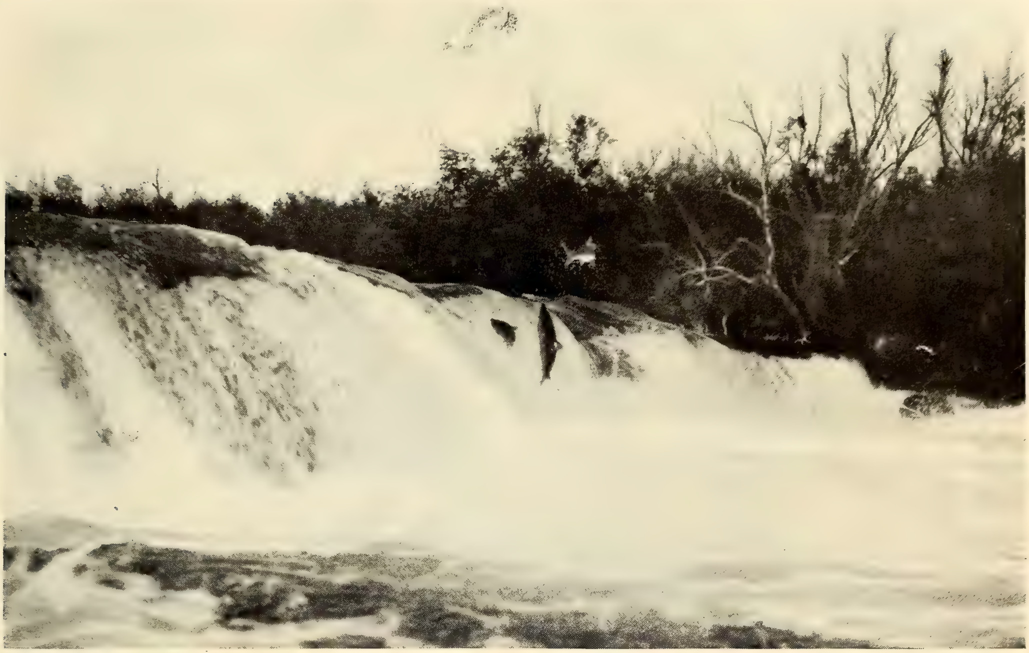
SPEARING OUR SUPPER AT THE FOOT OF THE SALMON FALLS

The salmon here were all the choicest reds, or "sockeyes," which command the highest price on the market.

Photograph by R. E. Helt

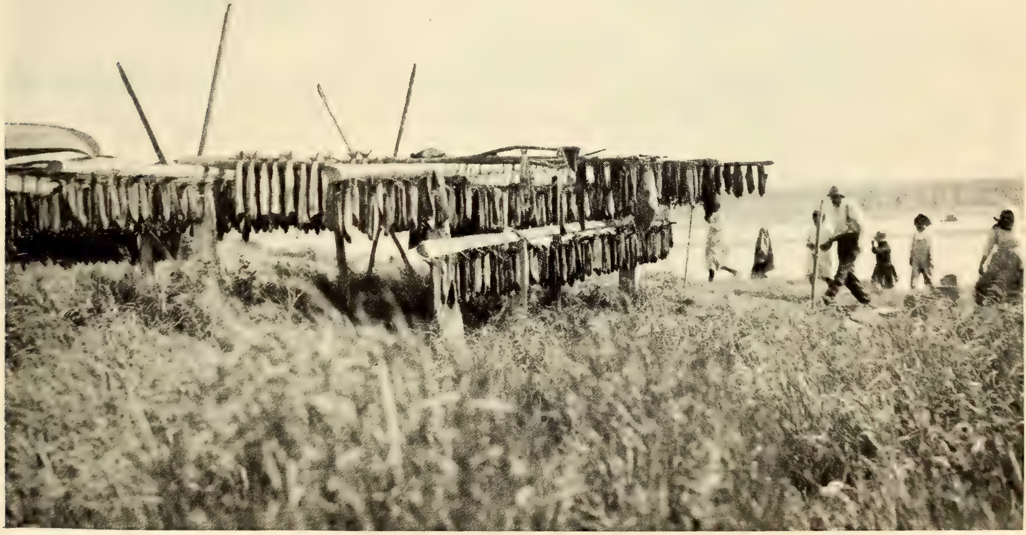
TAKING MOTION PICTURES OF THE SALMON FALLS

Thinking to get pictures of the fish landing at the top of the falls, Mr. Kolb waded out to a favorable position, but as soon as he entered the water the jumping stopped and did not begin till he had waded ashore. As the fish could not see him, nor hear him, they must have detected his presence by the sense of taste; yet he wore rubber boots.



SALMON JUMPING THE FALLS AT THE OUTLET OF LAKE BROOKS

These falls, only five miles outside the boundaries of the park, are ascended annually by many thousands of fish, pressing upstream to their spawning grounds in the lake at its source.



Photographs by E. C. Kolb

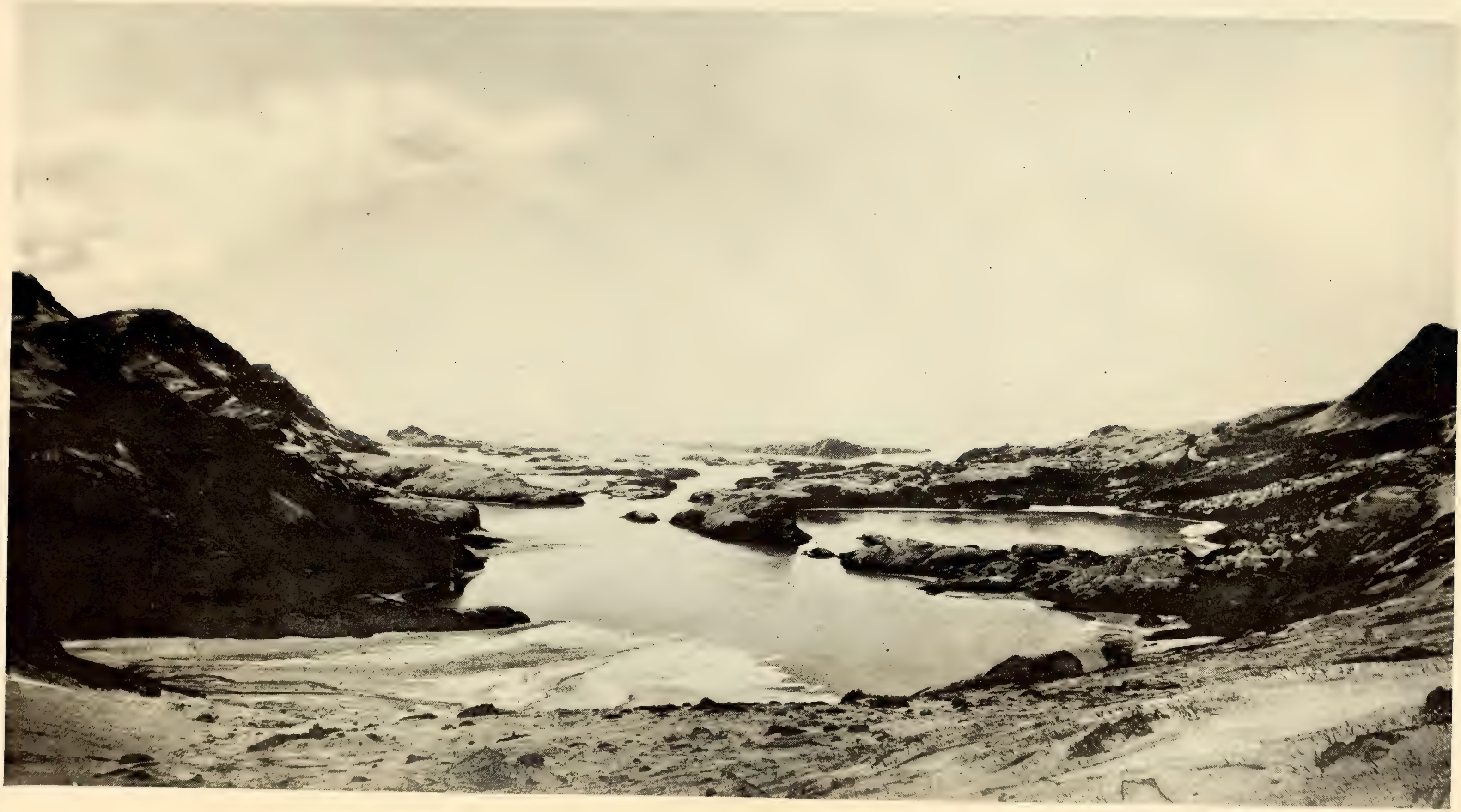
NATIVES DRYING SALMON AT THE MOUTH OF THE NAKNEK RIVER

The catch from this single district, Bristol Bay, was worth in 1918 more than three times the entire price paid by the United States for Alaska. Unfortunately, it must be added that overfishing has so greatly reduced the runs that the canning industry will soon become a thing of the past, unless the government takes measures to check the present reckless exploitation.

Photograph by E. C. Kolb

ISLANDS IN AMALIK BAY AT THE ENTRANCE TO GEOGRAPHIC HARBOR

Dotted with picturesque islands and girt round about by sublime mountains, it is one of the most beautiful bays on the whole Alaska coast.



Photograph by P. R. Hagelbarger

GEOGRAPHIC HARBOR FROM THE HILL AT ITS HEAD

The outer island, which is 500 feet high, is seven miles away. It is thoroughly secure from all manner of tempests. The waters are, moreover, abundantly deep for the largest ships. We found no bottom anywhere in the channel with a 54-foot line (see page 292).

LAKE GROSVENOR

This picturesque mountain lake is 28 miles long, large enough to be shown on the general map of North America. That so large a body of water could have remained entirely unknown is eloquent testimony of the unexplored condition of the Alaskan peninsula. It is a great pleasure to commemorate the constant interest of the President of the National Geographic Society in the Katmai problems by giving his name to this beautiful lake (see page 287).

The nearest refuge was at Ukak, about ten miles down the valley. The wind was so fierce that at best we had little control over our bodily movements, and we dared not attempt to flee down through that maze of fumaroles in the darkness of the night.

How we watched the diminishing shreds of our tent and counted time against the wasting fabric! Could it shelter us until it was light enough to flee?

Time and again the wind would pick us up, as we braced our backs unitedly against the wall, and roll us into a pile in the middle of the floor. I sat on a flat valise weighing fifty pounds, on which I had set for protection a big rock weighing as much more; yet the wind repeatedly picked up the whole bundle — man, box, rock, and all—and rolled us into the middle of the tent.

Yori with characteristic self-sacrifice, chose the most exposed end of the line. He drew a canvas tarpaulin over his head and shoulders in a vain effort to mitigate the blast. Soon it was the only protection he had, and for some time he sat practically outside, while the wet pumice was driven down his neck. He must have been bitterly cold, but never a complaint escaped him.

Finally, at 4 o'clock, the gray shapes of the fumaroles began to be distinguishable in the general blackness. I went outside and decided it was little worse than within, for there one could at least move around. So, though all were fearful of being blown bodily into one of the fumaroles, it was agreed that the time had come when we must try it down the valley.

Zies had a little flash-light, which made it possible to gather together the things we needed most; but before they were collected Allen came out and was almost literally carried away before the wind. Feeling that it was of the utmost importance for safety's sake that we keep together, I made frantic efforts to detain him, but he was gone like a ghost in the night, beyond recall, out of earshot almost at once. I turned my efforts to hurrying the others.

PICKED UP BODILY BY THE WIND

To face the gale was impossible; so I started backing toward the tent, bracing myself against the wind. Suddenly I found myself flying through the air, scared to death. I shall never forget the feeling of gratitude I experienced when my face landed in the mud, two gullies away. My feet kept on and nearly turned me another somersault, but I was safe on the ground again. The feeling that I was being carried bodily down the valley by the wind was one of the most terrible experiences in my life.

After that I decided it was useless to try to go back, so I started on to try to catch Allen and slow him down. Down the hill I sped, carried by the wind, with little chance of choosing my course. In the distance I spied the gray smoke of one of the big fumaroles dead ahead. I knew that I must avoid the yawning chasm by which it issued if I were to live.

By desperate scratching I managed to deflect my course a little, but slid by so close that had another gust, such as had picked me up, come just then I could not have avoided it.

It was some time before I could find Fenner and Zies, who were waiting for Charlie and me in a deep gulley. They had seen Allen go by down below, and we soon caught him and proceeded down the valley in somewhat more orderly, if none the less precipitate fashion.

The wind came obliquely over Baked Mountain, so that it was extremely difficult to avoid being drifted out into the middle of the valley, whereas safety required us to keep to the east side in order to make the ford of Knife Creek above the point where it plunges into an impassable canyon. If we missed the ford, our flight would have ended in a cul-de-sac among the canyons, from which there would have been no escape.

When we reached the shelter of Ukak, which trip we made in record time, despite the accumulated weariness of the day before and the strain of the night, we found, as we had hoped, that the camp was full. Every one jumped up to let us crawl into the warm sleeping-bags and we were soon sound asleep.

The gale continued all that day, but in the night it calmed down enough to permit us to visit the ruins the following day. The site of our former happy camp presented such a scene of desolation as can hardly be imagined. Everything was covered with pumice, blown onto the fallen heaps until no more could stick on.

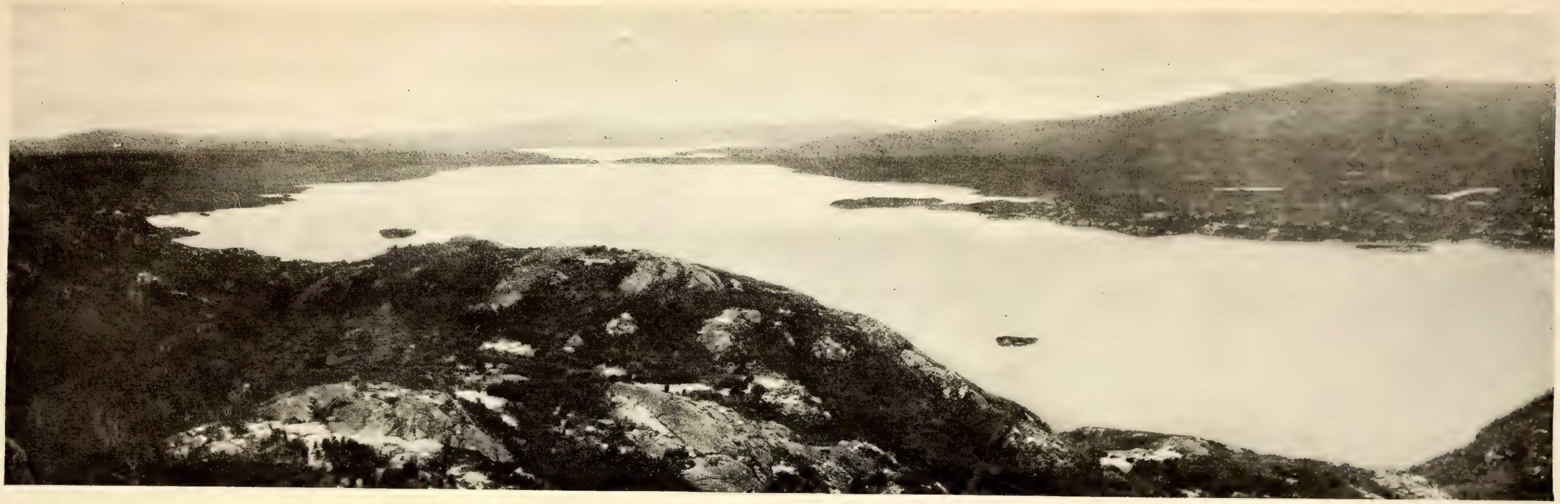
Pumice had drifted a foot deep against the big stone we had rolled over the sleeping tent. It was so heavy on the tent that it took the united strength of Yori and me to roll back the fallen roof so as to expose the things that lay on the floor.

The single cot, which had served primarily as a bench for keeping the photographic materials off the ground, was removed from the fallen tent by "Cæsarian section," and the scattered effects gathered together and stowed on it in a secure cache until it was finally decided to move the camp over in front of Mt. Cerberus, which experience had meanwhile proven to be sheltered from the severest winds (see pages 251 and 252).

BEAUTIFUL DIVERSIFIED LAKE AND FOREST CLOSE TO THE SMOKES

It will have become clear to the reader before this that life in the valley, even under the most favorable circumstances, has certain limitations which render the presence of a base camp in a less-devastated region a necessity; but it is doubtful if many realize how near the Valley of Ten Thousand Smokes lies to country possessed of the greatest charms of natural beauty. Within five miles of the fumaroles one enters heavily timbered country, which was little injured by the eruption and supports an abundance of wild life.

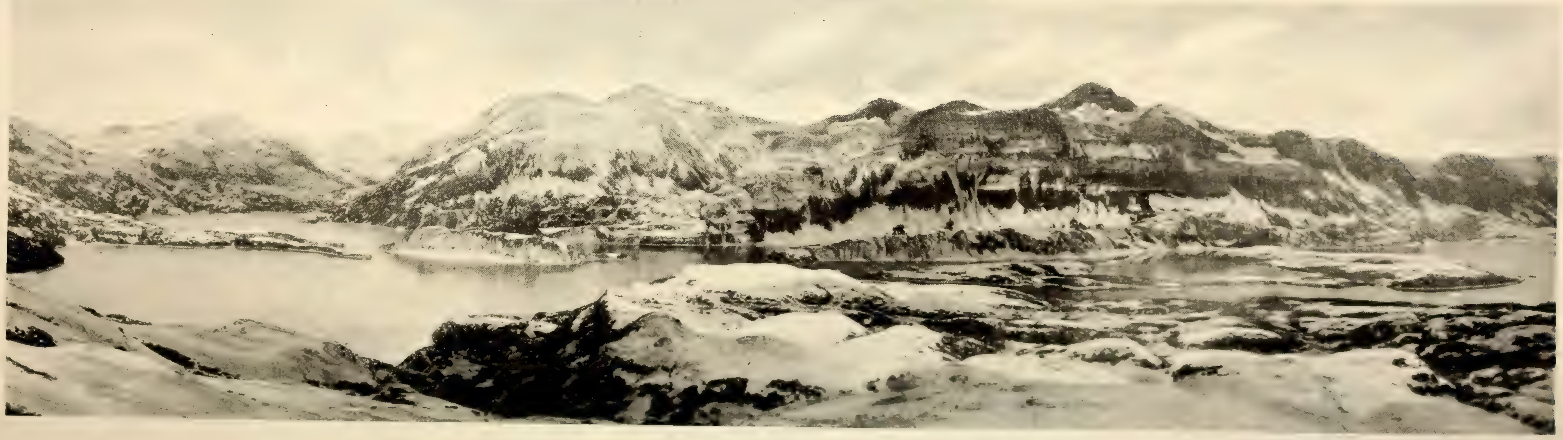
The whole of the Katmai National



Photograph by J. D. Sayre

LAKE COVILLE

Named in honor of Frederick V. Coville, chairman of the Research Committee of the National Geographic Society, who was among the first to realize the importance of a scientific study of the Katmai district.



Photograph by P. H. Hagelbarger

GEOGRAPHIC HARBOR

Its superb scenery makes it a fitting entrance to such a wonderland as the Katmai National Monument.

Monument is by no means a devastated wilderness, without interest save for its volcanic wonders. The upper end of Naknek Lake, which lies within the boundary of the park, is as beautiful a body of water as can be found anywhere. Its deep-blue basin lies between the wooded slopes of two mountains whose precipitous summits seem almost to overhang the water.

On the one side Mount La Gorce towers 3,000 feet aloft. On the other, Mt. Katolinat rises 5,800 feet in a series of castellated pinnacles formed by the breaking up of a remarkable, massive conglomerate which weathers out in great sharp battlements (see map, page 222).

Ivan Petrof, one of the first agents of the American Government to travel these parts, was so impressed with the beauties of Naknek Lake that he inserted in his report a colored picture showing the east arm, or Iliuk Arm, with Mt. Katolinat, the only plate devoted to scenery in an account of travels that reached almost every corner of Alaska.

On scaling the pinnacled ridge of Katolinat, a feat which appears well-nigh impossible from below, but yet is easily accomplished, one obtains an unsurpassable view over wide stretches of country. Down the lake one may look on a clear day out across the flat, tundra-covered coastal plain to the waters of Bering Sea, nearly a hundred miles away. Behind him, to the south, stands forth the whole range of snow-capped volcanoes, plainly visible for 120 miles, from Douglas to Peulik, as grand a collection of glacier-covered volcanoes as can be imagined.

To the east lies the broad, green valley of Savanoski River, giving easy passage behind the range to the shores of Kamishak Bay on Cook Inlet. To the north is a great expanse of lake and mountain country heavily covered with forest.

LAKES GROSVENOR, COVILLE, AND BROOKS

Lying roughly parallel with Naknek Lake, one descries three other large lakes which were quite unknown to the outside world until news of them was brought back by The Geographic expeditions. Two of them, which lie together, joined by a short but swift river, we named for the two men by whose vision and support the expeditions were made possible—Gilbert Grosvenor and Frederick V. Coville. The third we honored by naming after the dean of Alaskan explorers, Alfred H. Brooks, who likewise has had a large share in helping forward the work of the expeditions (see map, page 222).

Lake Grosvenor, which is 28 miles long, is even more beautiful than Naknek Lake. Sayre and Miller, who surveyed it, describe it as "the most beautiful spot in Alaska," which is high praise when it is remembered that it comes from men familiar with all the beauties of the celebrated "Inside Passage."

On all sides this lake is shut in by high, forest-clad mountains, which give it a charm that will certainly make it a favorite place of retreat when the park becomes a popular resort (see pp. 284, 288). It may be reached by an easy portage of a mile and a half from near the northeast corner of Naknek Lake, or by ascending its outlet from the Sabanoski River; for, although Lake Coville extends out of the mountains into the coastal plain, the system drains back into the head of Iliuk arm.

Lake Brooks (see page 288) lies on the other side of Naknek Lake, to the west, also separated from it by a high mountain. It is smaller than the others, only about 15 miles long, but it is quite large enough to show up on the general maps of Alaska. Like the others, its drainage is reversed; it empties from its "upper" end by a short river running into a bay on Naknek Lake.

WONDERFUL LEAPING SALMON

In the outlet stream from Lake Brooks is a waterfall about six feet high, which is an extremely interesting place to visit when the fish are running. These lakes are among the greatest spawning grounds in the world for the sockeye (red) salmon, which is considered the choicest species by the connoisseur of tinned foods. Of late years the runs have been much reduced by the operations of the canneries, but they still run into the lakes in unbelievable numbers.

The falls in the outlet of Lake Brooks afford an unsurpassed opportunity to observe the continuous procession of sal-

MORNING MISTS ON LAKE GROSVENOR

For the exploration of the lakes the expedition made use of native skin kayaks, now almost a thing of the past. Our surveyors describe Lake Grosvenor as "the most beautiful place in Alaska," which is high praise from men familiar with the beauties of the celebrated "Inside Passage" of southeastern Alaska.

Photographs by J. D. Sayre

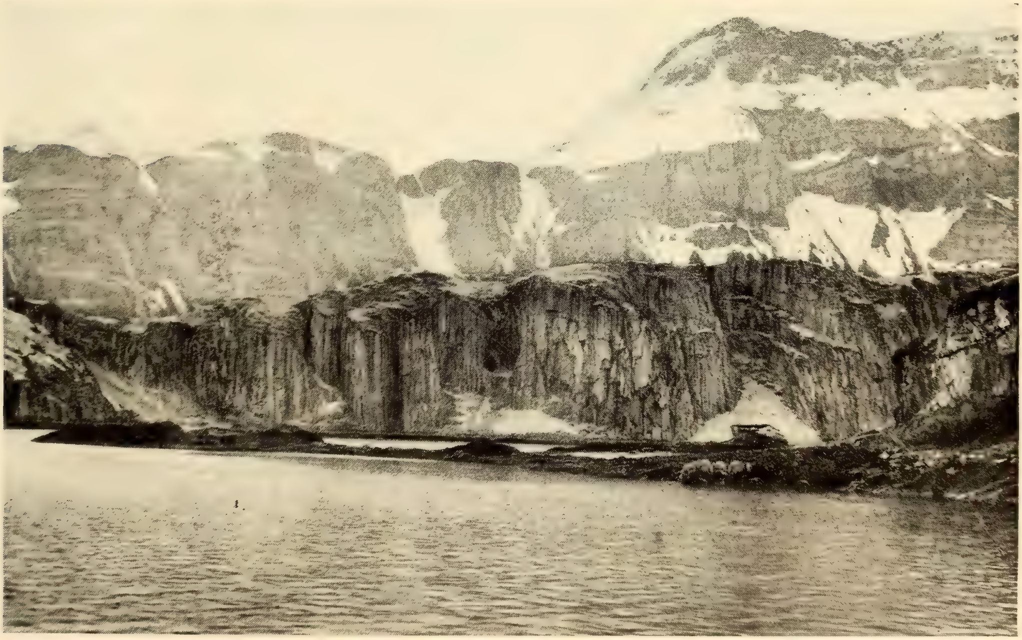
THE OUTLET OF LAKE BROOKS

This beautiful body of water, fifteen miles long, is one of the discoveries of the expedition. The lake is named after Alfred H. Brooks, Alaskan explorer and for many years chief of the Alaskan Division of the U. S. Geological Survey. It was to this lake that the leaping salmon were running (see illustrations, pages 266, 280, and 281).

Photograph by L. G. Folsom

THE KATMAI EXPEDITION'S BOAT, THE "NIMROD," EXPLORING THE COAST IN SEARCH OF A HARBOR

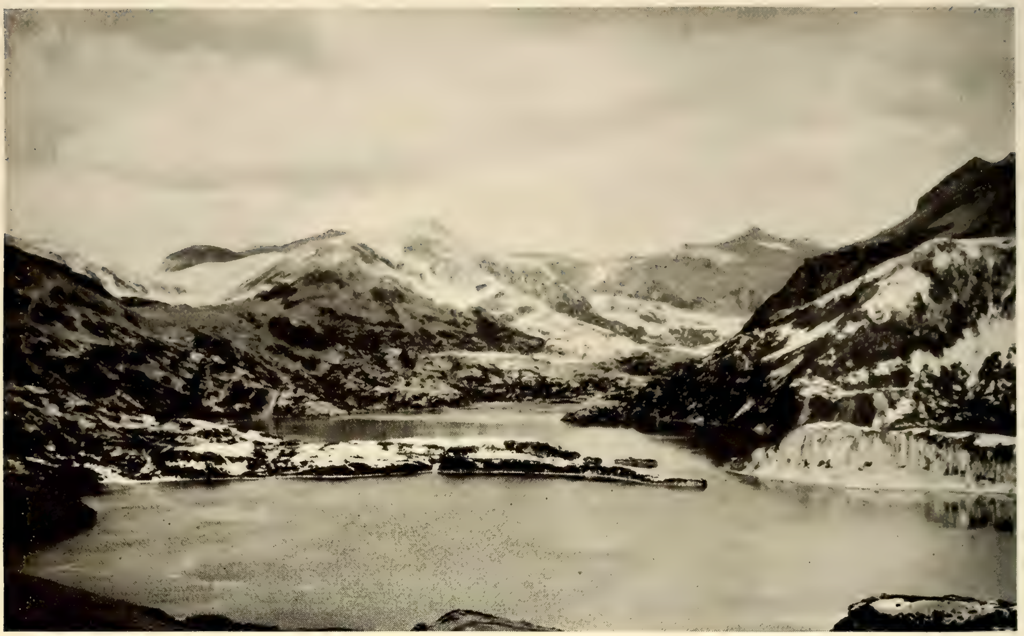
Geographic Harbor, which was discovered by the expeditions, affords ready means of access to the whole region. Only 50 or 60 miles of automobile road is needed to open up all the wonders of the area to the public. When that is constructed, the traveler may tour the Katmai National Monument as easily as he now visits the Yellowstone.



Photograph by R. F. Griggs

MOUNTAIN WALL OF GEOGRAPHIC HARBOR

On entering this haven, one has an unusual opportunity to study volcanic action; for, contrasting with the ash of the recent eruption, there is an enormous lava flow that poured down the bay in Tertiary times, forming beautiful columnar joints, as seen in the nearer cliff.



Photograph by W. L. Henning

GEOGRAPHIC HARBOR (SEE TEXT, PAGE 291)

An easy pass, with an altitude of 1,200 feet, connects this harbor with Katmai Valley. About 60 miles of automobile road is all that is required to make the Valley of Ten Thousand Smokes and the whole Bristol Bay region readily accessible. The white spots on the ground are not snow, but ash from the recent eruption.

mon leaping upward under the urge of an irresistible instinct to reach the lake above, there to spawn and die.

Here we stood for hours, held by the fascination of the sight, as fish after fish leaped clear of the water and up over six feet of fall into the current above. Never was there a second when some fish did not make the try. Sometimes there were six of them in the air at once.

After careful count, we estimated that, although many fell back into the pool below, they were going over at the rate of 1,200 an hour. A little computation will show that in the course of a few days an enormous number of fish must pass up into the upper lake. What a sight they must have been in the old days, before overfishing by the canneries had depleted the runs!

It is too bad that the boundaries of the park do not include the falls, for there is no better place in the whole world to watch this wonderful sight.

Like the bear which made off at our approach, we took our toll of the "silver horde" lying in the pool below the falls, for they added a variety to our larder that was very grateful (see page 280).

TROUT 32 INCHES LONG

In addition to the salmon, the natives catch abundant "white fish" in gill-nets set in the lake; but we tried only the giant trout, with which the lakes and rivers are fairly teeming.

We had no need of any of the artificial flies which are supplied to anglers by the trade. These trout had such voracious appetites that our fishermen never had to cast more than once or twice before they had a strike that kept them busy.

Our bait, a scrap of bacon rind, was snapped up so quickly as to raise the suspicion that a piece of paper or anything else white would have served equally well. Our only trouble was that the fish were so big that they soon broke up all our tackle. Our catch averaged two feet in length; the largest, captured by Wallace, measured full 32 inches from nose to tail.

Bears are abundant in this country. Our work was too exacting to permit us to take the time for a hunt, but we came upon them rather frequently as we tramped about the country, and one morning we killed one on the beach right in front of our tent. Their size is almost unbelievable. I have measured tracks 9 x 14 inches in hard ground, while in the soft places the same animal left a trail like an elephant, the individual tracks measuring 10½ x 16 inches, more than big enough to cover the two pages of this Magazine as it lies open.

A fox, ordinarily the shyest of animals, used regularly to bring her litter to feed at the garbage pile a few yards from our tents. Moose were common before the eruption and are beginning to come back. Caribou were formerly very abundant and may be expected to return in plenty within a few years. Elk were also found occasionally.

There are grouse in the woods, and the numerous lakes and ponds are the breeding grounds of innumerable waterfowl of all sorts—swans, geese, and many kinds of ducks in immense numbers. We saw one flock of five hundred swans on Naknek River, while smaller flocks were frequently met.

Under the circumstances, the abundant geese and ducks attracted little notice, although the latter were far easier to bag than their larger cousins. We killed no geese, but shot a number of swans near our various camps. Their flesh is superior to any fowl I have ever tasted.

The Katmai National Monument is well located to serve as a sanctuary to conserve all this wild life, and will doubtless ultimately become one of the most important game preserves in the world.

Photograph by P. R. Hagelbarger

THE COLORS OF THE EXPEDITION ON NAKNEK LAKE

Our dory was the first power boat that ever sailed Naknek Lake.

DISCOVERY OF AN ENTRANCE TO THE KATMAI DISTRICT

Since the district has been set aside as a national monument by proclamation of the President of the United States (see THE GEOGRAPHIC for April, 1919), the first question in every one's mind has been, Can the place be made accessible? It is ideally located for a side trip from what will undoubtedly become the favorite Alaska tour when the new government railroad is completed—the trip through the "Inside Passage" and along the coast, under Mt. St. Elias, to the head of Cook Inlet, thence into the interior past Mt. McKinley by rail and up the Yukon by steamer, returning via the White Pass.

To reach Katmai from the route of this tour would require the steamer to travel only a few hours out of her course. But it is self-evident that no great number of people can ever enjoy the Katmai National Monument if they are compelled to land in small boats through the surf, as we have had to do. Until our discovery, however, it was not known that a safe harbor existed in such a position as to furnish a feasible route from the sea to the Smokes.

A large place in the plans for 1919 was, therefore, given to the thorough exploration of the coast-line in hopes of finding a suitable harbor. One party, under the direction of P. R. Hagelbarger, spent almost the entire season in this work, and was able to report that they had found a harbor that was all that could be desired, and that there was a good route from it back into the reservation.

The new harbor, which we christened Geographic Harbor in honor of the Society responsible for the discovery of the wonders of the district and for its reservation as the Katmai National Monument, lies in an arm of Amalik Bay, in an area hitherto shown as dry land on all charts (see map, page 222).

Boldly entering a narrow canal at the head of the charted portion of Amalik Bay, one steers a straight course for about a mile, when he finds himself in a broad inner bay, completely landlocked and secure from all manner of tempests. The inner bay is bisected by a chain of islands thrown across it, but there is a good passage around them, admitting one to the innermost harbor, which measures about two miles in diameter.

We had no apparatus for making complete soundings over the whole bay, but found the channel by which we had entered so deep that we got no bottom anywhere with nine fathoms (54 feet) of line. There is thus both plenty of water and room for the largest ships.

From the head of the bay an easy pass of 1,200 feet leads over the divide into Soluka Valley, which is entered close to a fine hot spring and sightly waterfall. This valley leads directly into Katmai Valley, to which it is tributary, thus affording a favorable route for the construction of a road through the whole of the district.

The length of road necessary to reach the Valley of Ten Thousand Smokes and to connect with navigation on Naknek Lake is not more than 50 or 60 miles. When this road is built it will be possible for a tourist to leave his steamer in the morning, traverse the Valley of Ten Thousand Smokes, and return to the boat before night.

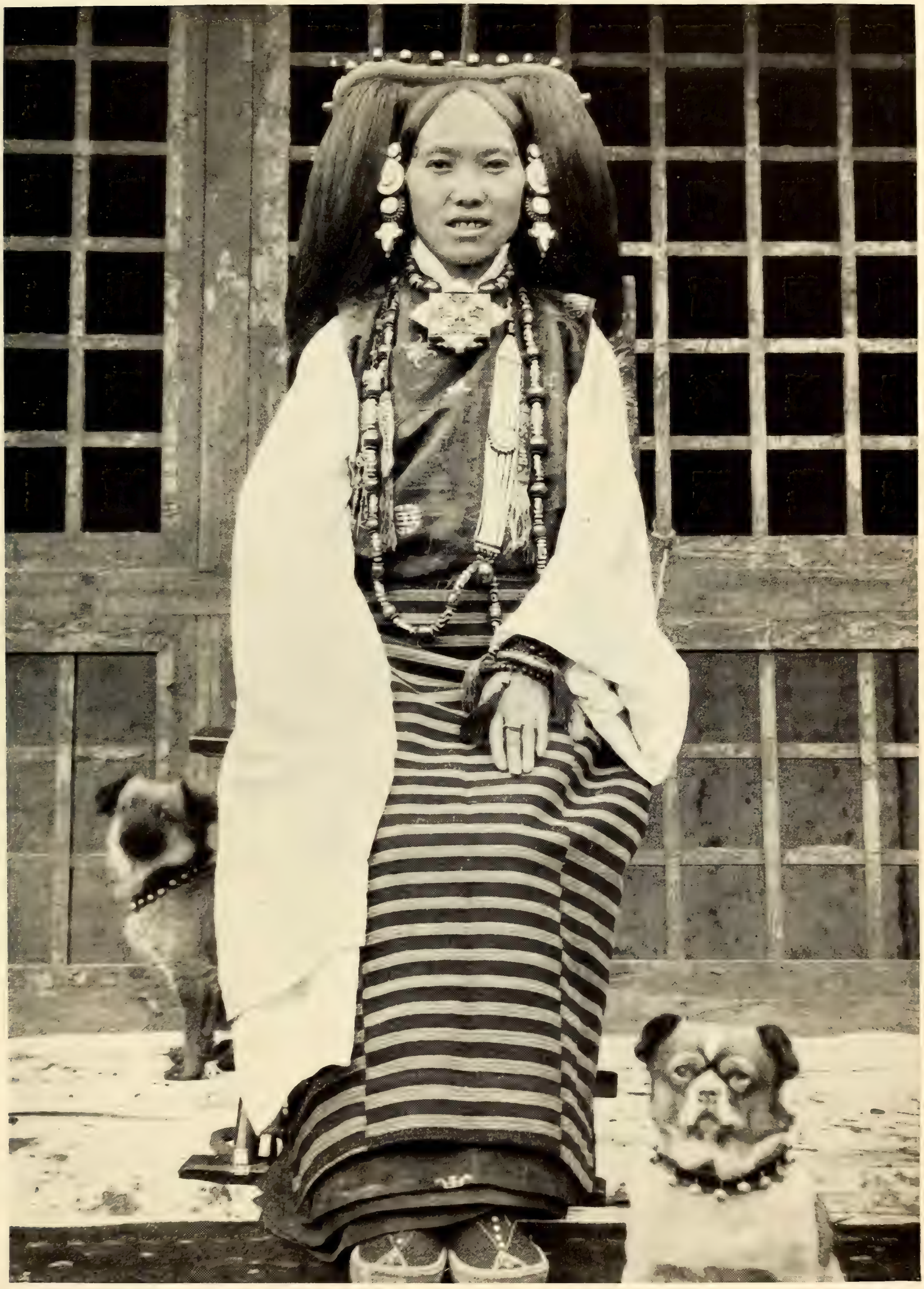
Few there are, to be sure, who would be content with a single glimpse of the wonders of the place; but, as far as covering the distance is concerned, a few hours would be all that was required for the actual travel.

GEOGRAPHIC HARBOR A FITTING ENTRANCE TO SUCH A WONDERLAND

Not only is this a safe and commodious harbor, but it is a fitting entrance to such a wonderland as the Katmai National Monument, for it is one of the most picturesque bays along the whole Alaskan coast. It is surrounded on all sides by the most rugged mountains, rising more than 3,000 feet out of the water.

With the exploration of a route into the Valley of Ten Thousand Smokes, the field program of the Katmai Expeditions has been completed. Although there remain many scientific problems yet to be solved, the general features of this region may be said to have been made known. It has been set aside as a part of our great national park system, for the perpetual use and enjoyment of the nation.

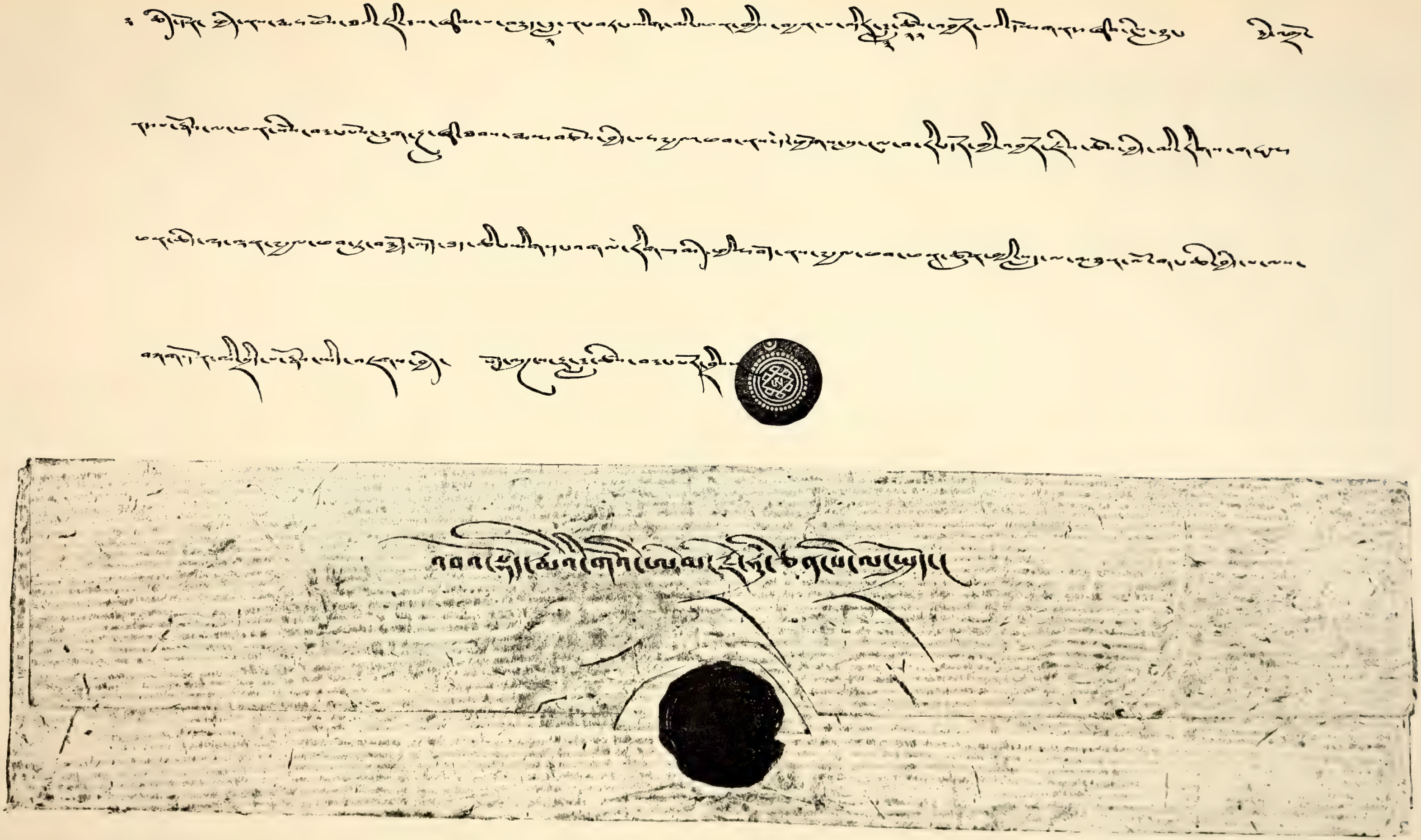
A route for a road by which the region can be made as accessible as any other of our national parks has been explored. It remains for the people to decide when such a road shall be constructed and the region opened to public travel.



Photograph by Dr. A. L. Shelton

WIFE OF THE GOVERNOR OF LOWER KHAM: TIBET

She is from southern Tibet and was very gracious in her hospitality to the American physician and his family while they were in Gartok. She is of small stature and is quite fond of her Tibetan dog. She is a woman of great ability and would sometimes dance at an evening entertainment to the accompaniment of the Scottish bagpipes (see page 297).



Photograph from Dr. A. L. Shelton

PERMISSION FROM THE DALAI LAMA, WITH HIS OFFICIAL SEAL AS SPIRITUAL AND POLITICAL RULER OF TIBET, TO DR. A. L. SHELTON, AND THE ENVELOPE IN WHICH IT CAME

The author of this article enjoys the unique distinction of having been invited to visit the Dalai Lama in the mysterious city of Lhasa. The permission came as a result of the American physician's ministrations to stricken Tibetan warriors. The Dalai Lama wished to profit by the Westerner's healing powers. Unfortunately, the prospective guest was captured by Chinese bandits and held for ransom while on his way to Lhasa. After many dangers and privations he managed to escape, but not until he had sustained injuries which necessitated his immediate return to the United States for serious operations, which restored his health.

LIFE AMONG THE PEOPLE OF EASTERN TIBET

BY DR. A. L. SHELTON

FOR SEVENTEEN YEARS MEDICAL MISSIONARY AT BATANG, NEAR THE CHINO-TIBETAN BORDER

WHERE East meets West on the border line between China and Tibet, the broad rôles that have come to be understood by those brief terms are completely reversed. There it is the East, personified by China, that has represented the greater progress; and Tibet, which stretches far to the west, that has preferred to exist for centuries behind the world's greatest rampart of mountains, inhospitable to the knocking of ideas more modern than its own.

Of all the great forces that have molded the outside world, only Buddhism, it might be said, has left its impress behind Tibet's towering border, and even that force, having once gained access, has been almost swallowed up in the devil-worship which is the highest religion that the Tibetans themselves have evolved.

Until recent years, practically nothing was known of Tibet by Caucasians except the doubtful information contained in the writings of a few adventurous travelers who in the Middle Ages made brief excursions into the country. The few resolute modern explorers who won their way behind the barriers of mountains and deserts were invariably turned back after brief sojourns, usually in the sparsely settled regions of the north.

LHASA REVEALED TO THE WORLD IN 1904

The expedition of Sir Francis Younghusband to Lhasa, the capital of Tibet, in 1904 made that hitherto forbidden city known to the outside world. More recent visits of travelers have added still further to the general knowledge in regard to Lhasa and a few other important valley towns close to the Indian border.*

But just as a familiarity with New York or Paris leaves much to be learned about the United States or France, so the knowledge that has been gained about Lhasa and its neighboring communities fails to afford an adequate picture of Tibet and the Tibetans. In regard to the nomadic people of the uplands and life in the villages of the agriculturists, that dot the many smaller valleys of Tibet, much has remained unknown.

While the complete picture of Tibet and its inhabitants probably will not be filled in for many years, my long sojourn in the border country where western China meets eastern Tibet, and my close association with its people, who with a very few exceptions are the people of Tibet, enable me to sketch in a few lines regarding Tibetan conditions outside the larger cities.

SCENE OF STRIFE BETWEEN TIBETANS AND CHINESE

The southern portion of the border between China proper and Tibet is approximately the valley of the Yangtze, where that great river flows almost due south at the eastern end of the Himalayas before making a great swing to the northward through the most populous part of China. Where the Yangtze separates China and Tibet it is already a river of considerable size, its waters being between 700 and 1,000 miles along their way in their 3,400-mile journey to the sea.

Quite apart from the political divisions and nominal government, the region on both sides of the Yangtze where it flows south is in reality Tibetan. A territory approximately the arêa of Alabama, with Batang as its center, has been the scene in recent years of much strife between the Tibetans and the soldiers of China, whose officials were expelled from Tibet during the Chinese revolution in 1912.

Such authority as China maintains in this border region is most tenuous, and to the west of the Yangtze Valley it may be considered to vanish entirely.

This region contains both Protestant and Roman Catholic missions, and connected with the former is a medical mission. It marks the closest approach from the east of Christian influences and modern conceptions of sanitation, medicine, and surgery toward Lhasa, strong-

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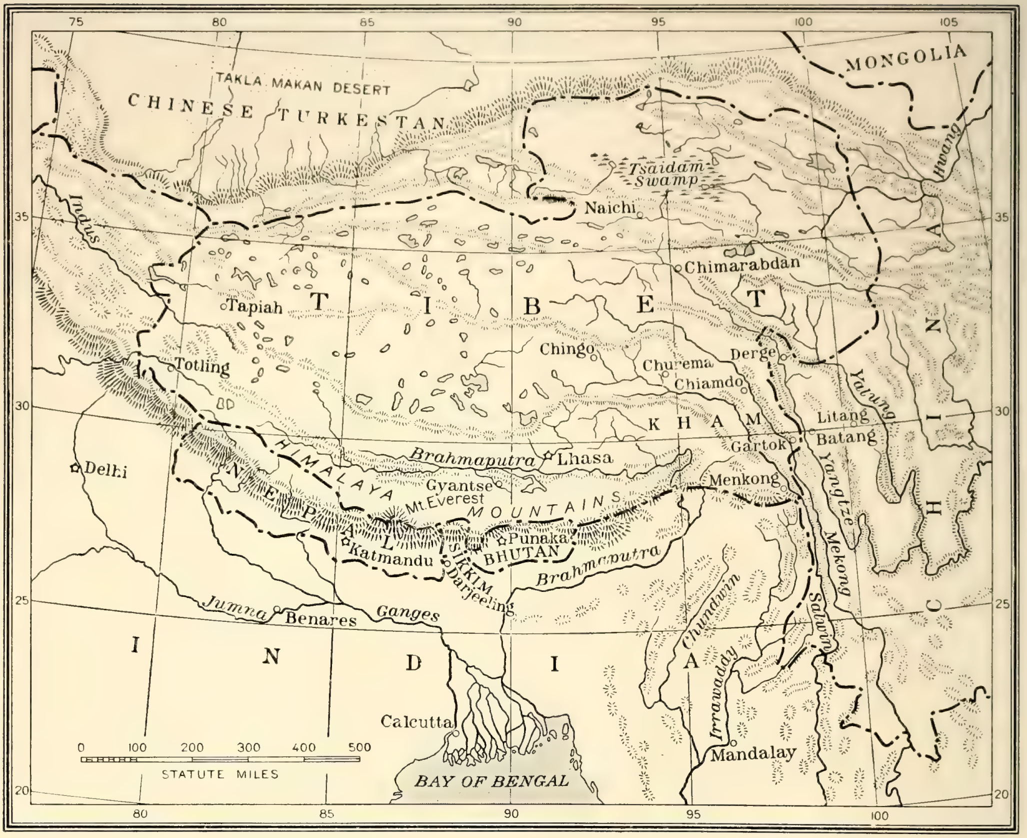
* See, in the NATIONAL GEOGRAPHIC MAGAZINE, "The World's Strangest Capital," by John Claude White (March, 1916), and "The Most Extraordinary City in the World," by Dr. Shaoching H. Chuan (October, 1912).



Drawn by James M. Darley

A MAP OF TIBET AND BORDER COUNTRIES

The meagerness of authentic information concerning the interior of Tibet is indicated by the fact that the population of its 463,000 square miles is variously estimated at from 1,500,000 to 6,000,000. The only census ever taken of the country was that conducted by the Chinese nearly two hundred years ago, showing 316,000 lamas (monks) and 635,000 laity. For a more detailed map of this region, see the National Geographic Society's "Map of Asia," published as a supplement with the May GEOGRAPHIC.

hold of Lamaism—the degenerate Buddhism of Tibet.

The border region is a country of mountains. Batang, the chief city, is one of the lowest points, and yet its altitude is 9,000 feet above sea-level, nearly twice that of Denver.

Most of the surrounding country is 12,000 to 15,000 feet high, the latter altitude being more than 500 feet higher than Mt. Whitney, California, highest peak in the United States proper. From this great upland rise numerous peaks 20,000 feet and more in height.

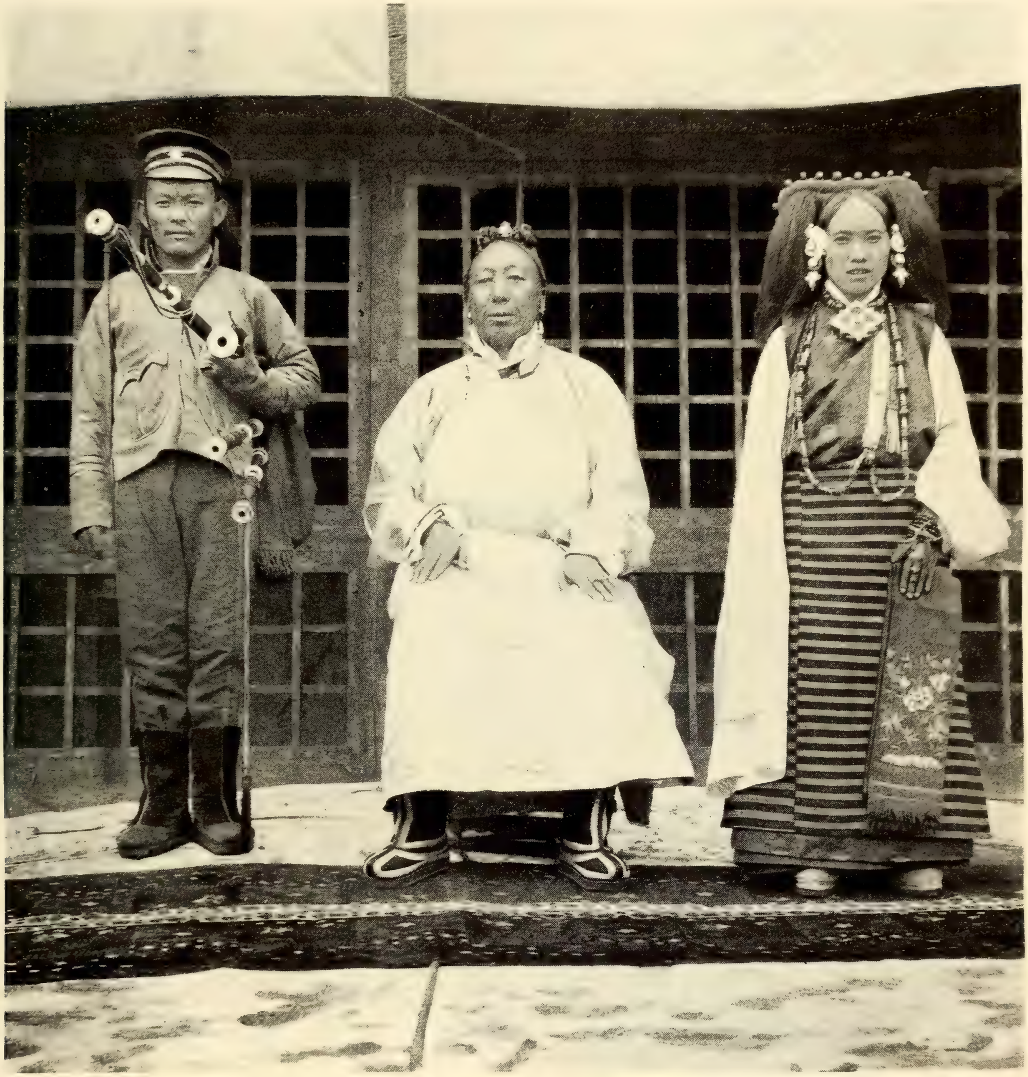
The view from the summits of some of the passes that must be traversed in traveling about this marvelously rugged country can hardly be surpassed anywhere in the world. The panorama for hundreds of miles on a clear day is one of countless high peaks interspersed with greater snowy masses that exceed in height the topmost pinnacles of all other continents.

Below timber-line are some fine forests, and the Alpine-like flowers of the short summer are exceedingly beautiful. Here and there among the mountains are clear, sparkling lakes, their waters so cold that in most of them fish cannot live.

STRANGE MYTHS AS TO THE ORIGIN OF TIBETANS

Kham, the easternmost province of Tibet, gives its color to the entire border region, and its people are said to be the most robust of all Tibetans.

Little is known of the origin and an-



Photograph by Dr. A. L. Shelton

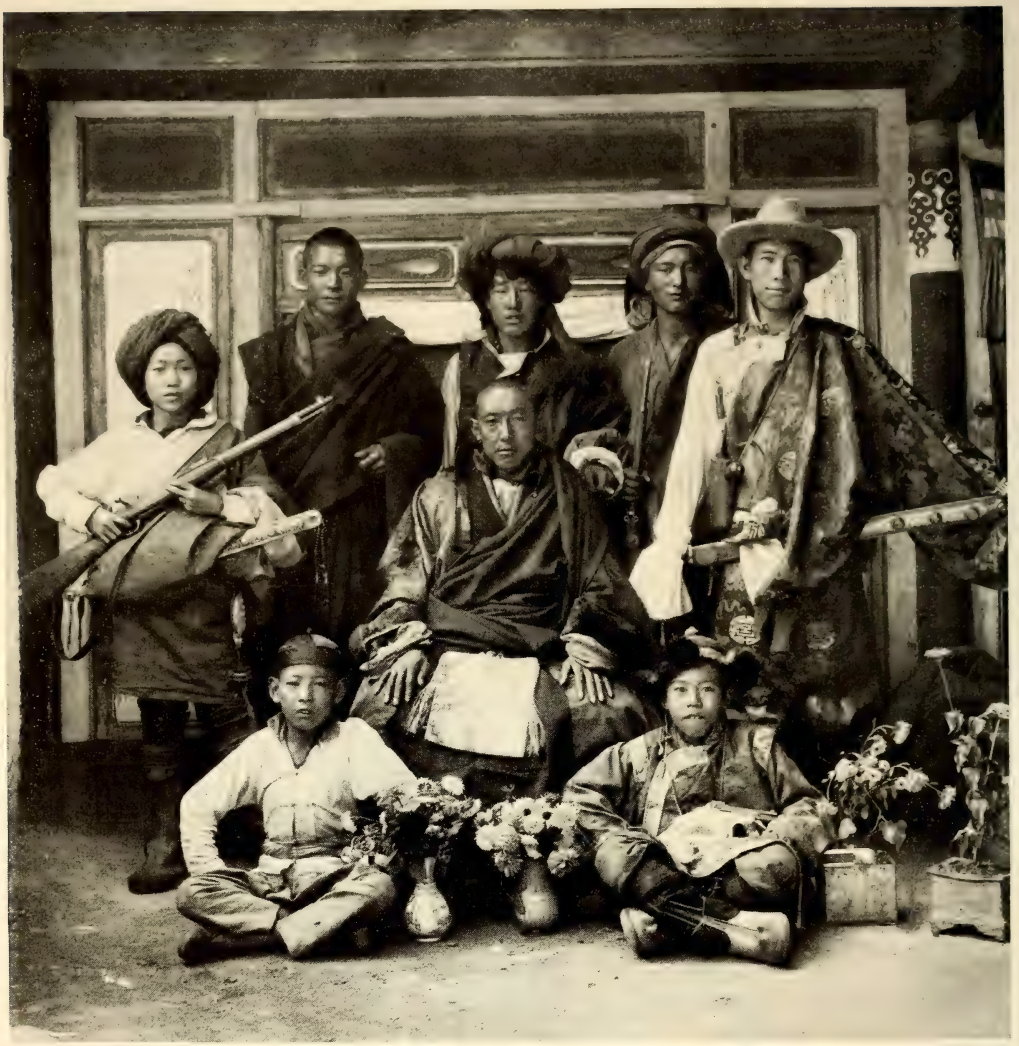
THE GOVERNOR OF LOWER KHAM, HIS WIFE AND PIPER

This piper was brought down from Chiamdo, a ten days' journey, for the entertainment of the American physician and his family. The Tibetans have adopted the Scottish bagpipes as their national military instrument. It was startling to hear the piper playing "The Cock of the North," "The Campbells are Coming," and "The Drunken Piper." He played with great skill, for the Tibetan instructors have learned their music in India (see page 293).

cestry of the Tibetans. This is probably due in large part to the rigid exclusion of men of science and other travelers. The Tibetans themselves dismiss the subject with hopeless fairy tales and legends. One of these has it that the progenitors of the race were "a she-devil of the Himalayas" and an ape from the plains of Hindustan.

To the lay observer there is no resemblance whatever between the Tibetans and the Chinese, nor are they similar to the Malayans. In features and characteristics they resemble the American Indians more nearly, perhaps, than any other distinct type, although in color and other characteristic features there is an indication that they may have sprung from the original Mongol people.

Many of the people of Kham are nomads, who tend their flocks of sheep and yak as they graze over the uplands, and



Photograph by Dr. A. L. Shelton

THE HIGH PRIEST OF BATANG WITH HIS ATTENDANTS

Both Chinese and Tibetan influences are seen in the features and dress of the attendants, while the rifle suggests the inroad of Western ideas.

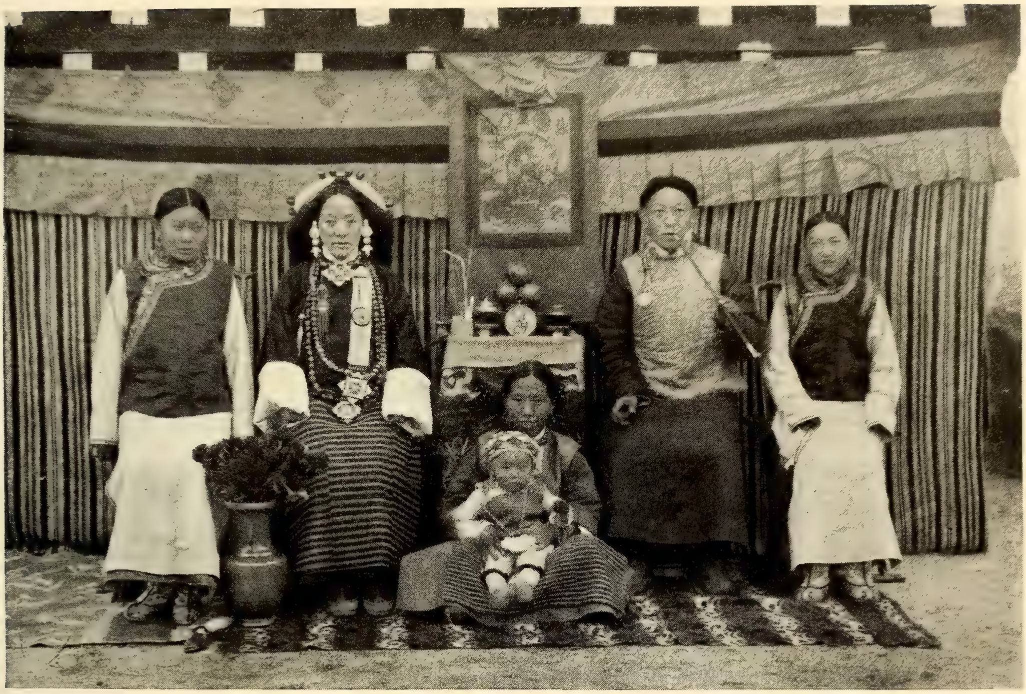
live in black yak-hair tents. Others engage in a crude sort of farming in the valleys where the altitude is low enough for grain to mature.

The nomads live the year round in their tents, seldom even entering a house. When the lower slopes of the mountains become free from snow in the spring, they begin their upward pilgrimage with their herds, closely following the receding snow-line, until in summer they are living far up in the highlands and on the sides of the peaks.

When winter begins to set in they make the reverse journey, going down to the valleys only as fast as the descending snow-line drives them. In this way they are able to utilize the supply of grass to best advantage.

The herders remain close to the snow also because their yak thrive best in a cold temperature and cannot, in fact, stand any great degree of heat, especially if introduced into the warmer temperature suddenly.

So carefully must the yak's predilection for cold be indulged that traders bringing supplies in summer from the



Photograph by Dr. A. L. Shelton

THE KING OF DERGE, HIS TWO WIVES, AND OTHER MEMBERS OF HIS HOUSEHOLD

Derge for many years was an independent state, but is now under Tibetan rule. The Chinese and Tibetan influences are here plainly seen.

high country to Batang will not drive their animals into the town. They unload ten miles from their supposed destination, at a point about 12,000 feet in altitude, and the Batang consignees must provide transportation for the remainder of the distance to the 9,000-foot level.

The agricultural people of the lower valleys live in substantial houses of mud with flat roofs. In constructing the mud walls the Tibetans use forms of parallel boards not unlike the forms used in the United States for molding walls of concrete. The mud is beaten into the forms until it is puddled, and when dry it is very hard (see page 307).

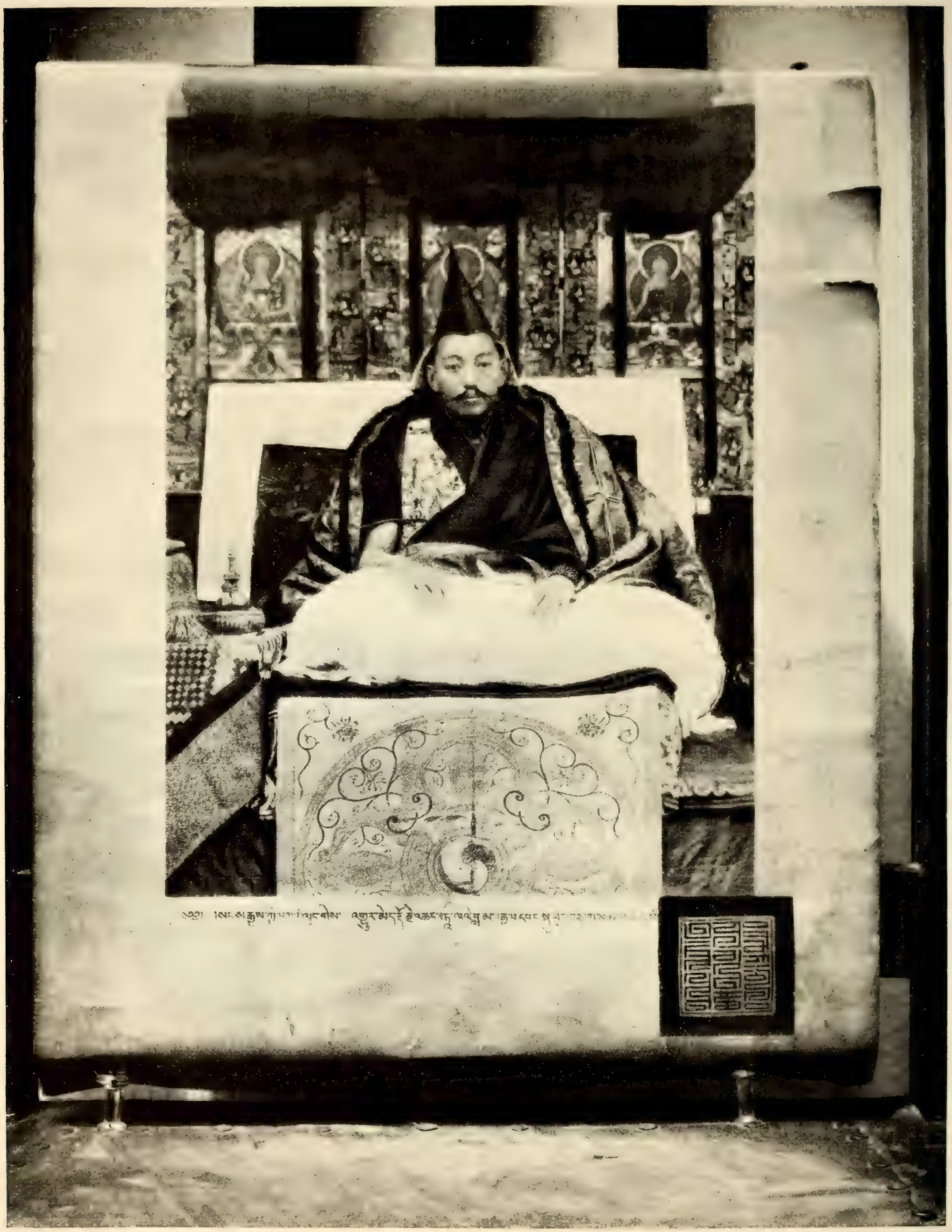
The agriculturists have few animals. Yak are employed for plowing, however, being brought down from the higher country for the purpose at the proper time.

CRUDE PLOWS DRAWN BY YAK

The farm operations are carried on under conditions that a well-equipped American farmer would consider a heavy handicap. The plows used are made entirely of wood, with a single handle. They have been developed beyond the most primitive types of wooden plows, however, having removable digging parts, which are replaced when worn or broken.

The front end of the beam of the plow is attached to the middle of a wooden bar, each end of which is bound to the horns of a yak. One person usually leads the yak team, while another walks behind, holding the handle of the crude implement. The work of sowing and plowing is done mostly by the men, while the women do the greater part of the harvesting, a division of labor the reason for which is not apparent.

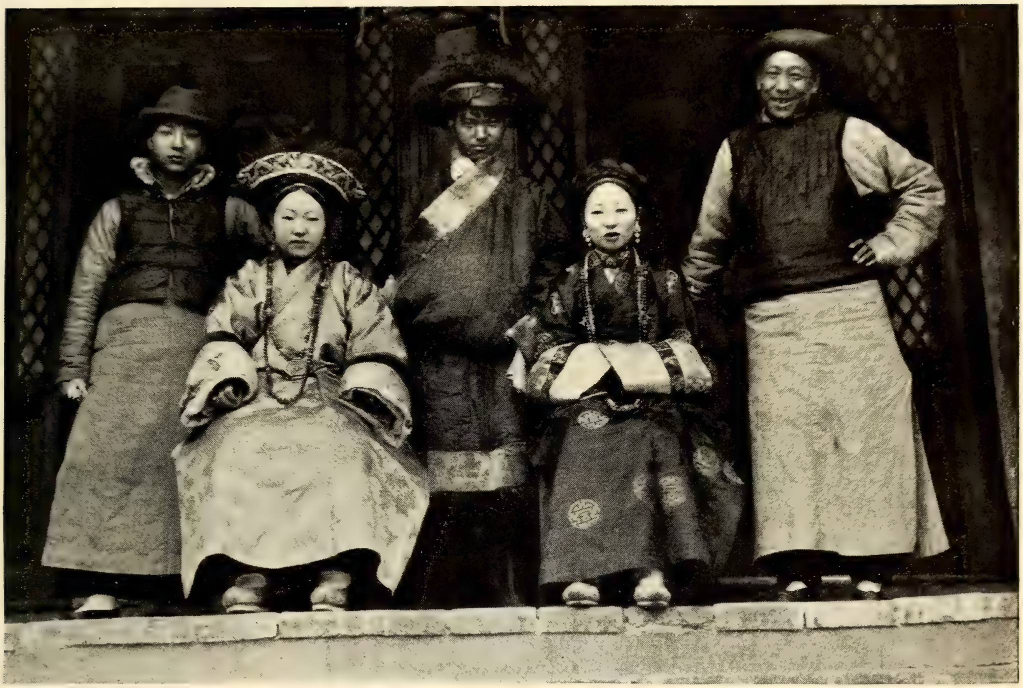
The harvested grain is carried to the tops of the houses, where it is threshed on the flat roofs by means of flails. Primitive mills are set up along the streams, where the grain is ground raw into flour and parched into "tsamba," the latter a particularly important article in the Tibetan diet. The mills are of a simple type common in many lands, consisting of a stationary lower stone and an upper stone revolved on the lower by



Photograph by Dr. A. L. Shelton

THE AUTOGRAPHED PHOTOGRAPH OF THE DALAI LAMA, A PRIZED POSSESSION OF THE GALON LAMA

The Galon Lama, or "receiver of commands," ranks immediately below the ruler of Tibet, who resides in Lhasa. The Galon Lama of Chiamdo was the commander-in-chief of the Tibetan army at the time when Dr. Shelton was asked to aid the wounded and sick warriors of the Tibetan forces (see text, page 319).



Photograph by Dr. A. L. Shelton

THE DAUGHTER OF THE KING OF JALA AND HER BRIDEGROOM

She is dressed in her bridal robes, with her husband (in the center) standing at her right. Jala, of which Tachienlu is the capital, is two provinces east of Batang.

means of a shaft extending upward through a central hole in the fixed stone. The shaft is attached to a water-wheel below.

"GOING TO BED" MEANS CURLING UP ON THE FLOOR

The living quarters in the homes of the valley folk usually consist of a single large room, in which all work, including the cooking, is done, and where the members of the family eat and sleep.

The comforts in such homes are meager indeed. In few establishments is there even the semblance of a bed. In the ordinary houses "going to bed" means merely loosening the girdle, opening the sheepskin garment, and curling up on the floor with the feet toward the stove, which is an essential feature of all habitations in this high, cold country.

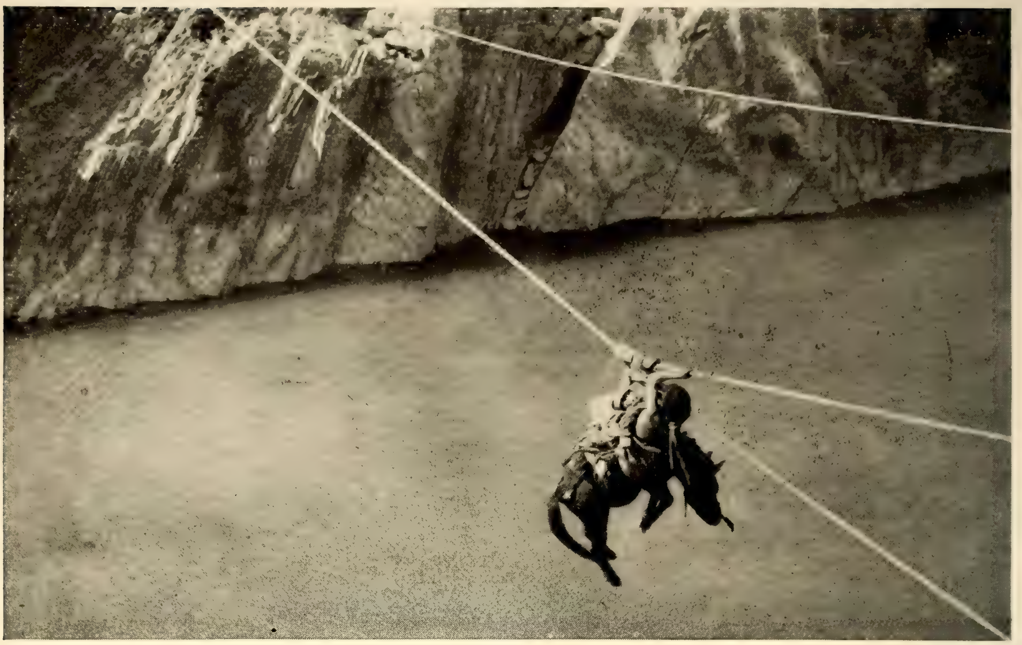
The stoves are built of mud, with a fireplace below and a hole in the top into which pots may be set for cooking. The stove is usually built to one side of the living room, and the members of the family, on retiring for the night, range themselves in a fan-shaped group about it.

Families possessing domestic animals share their houses with them. In two-storied houses the lower floor is the stable, and through it the living quarters are reached. In some one-storied houses the front portion is given up to the animals, while the family lives in the rear.

BARLEY MEAL AND BUTTER TEA THE TIBETAN MENU

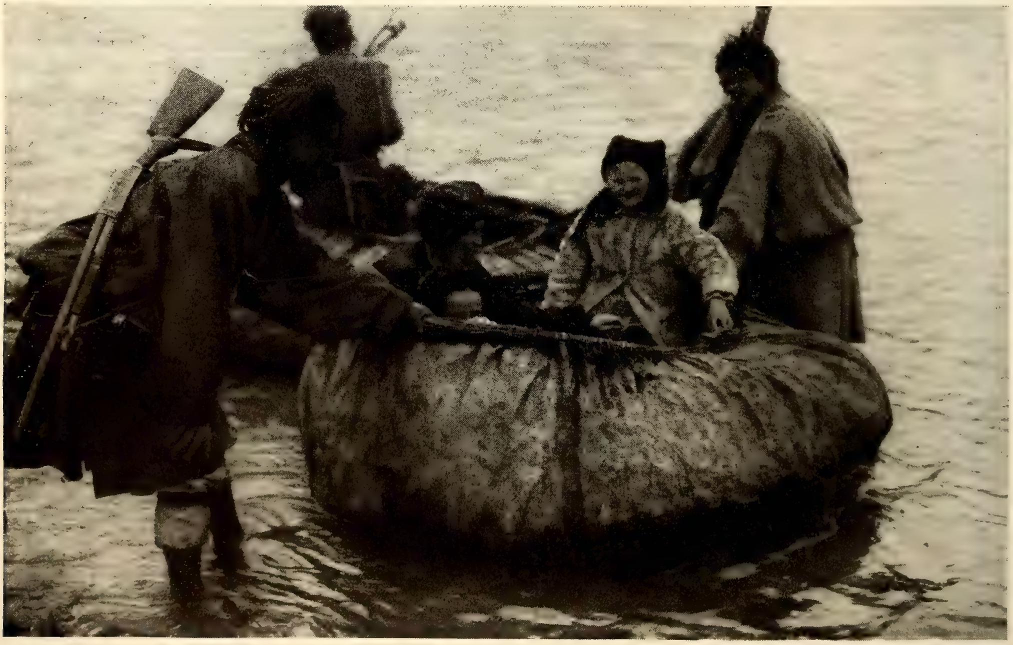
The food of the Tibetans is most monotonous to an American or European, accustomed to variety in his diet. They live almost the year round on two things, parched barley meal, called "tsamba," and "butter tea," neither of which seems at first view either appetizing or sustaining.

Tsamba is made by parching barley and then grinding it into a very fine flour. It becomes a sort of emergency ration, for, being parched, it requires no cooking. When Tibetans are on journeys or are wandering about with their flocks and herds, they carry tsamba in small leather bags inside their coats, thus always hav-



A THRILLING HORSEBACK RIDE ACROSS THE MEKONG RIVER

With his mount securely trussed to the rope bridge, the owner supplies his own motive power, hand over hand, as he pulls himself and beast across the chasm with the river far below.



Photographs by Dr. A. L. Shelton

CORACLES, OR SKIN BOATS, USED FOR CROSSING TIBETAN STREAMS

Such a craft has a framework of wattles over which is stretched green yak hides. The seams are sealed with pitch, which makes the boat practically watertight. Unless a person is careful, he is liable to stick his heel through the bottom, in which case it becomes necessary for him to keep it there until the boat has reached the other shore. A coracle is propelled by a native, who puts the broad paddle far out into the water and pulls it toward him.

Photograph by Dr. A. L. Shelton

PART OF THE LIBRARY IN THE LITANG LAMASERY

In Kham the sacred Buddhist writings are printed from blocks such as were first used in China, or are written by hand. The printing of religious books is one of the principal industries of the town of Litang. The Buddhist Bible is a work of 108 volumes and the companion commentary work is of equal bulk (see page 320).

ing at hand the materials for a hasty meal.

In preparing the other principal article of their diet the Tibetans first make a strong liquid by boiling the coarse Chinese tea which they prize most highly. The concoction is strained into a churn and to it are added a lump of butter, more or less stale, and a handful of salt. The queer mixture is then churned into an emulsion.

The typical meal among the valley folk of Tibet, and among many of the nomads as well, begins with the drinking of two or three cups of butter tea—a beverage which the Caucasian feels a constant inclination to speak of in quotation-marks, for to him it is neither tea, soup, nor gravy, but a combination of the three.

As the Tibetan drinks his hot butter tea, he continually blows back from the rim of his bowl the film of butter that rises to the top. After several bowls of the beverage have been drunk, there is a considerable accumulation of butter. The bowl is then half filled with the tea emulsion. Into the hot liquid, rich in butter fat, tsamba is now poured, to be kneaded by the fingers into lumps and eaten.

THE WOODEN BOWL IS LICKED CLEAN AFTER EACH MEAL

Knives, forks, and spoons are unknown in Tibet—all eating is done with fingers. The wooden bowl is carried in the sheepskin garment next to the skin, and each time after being used it is licked clean with the tongue and replaced in the garment.

To an observer from Europe or America it seems impossible that the Tibetans, leading a fairly active life in a country of rigorous climate, could be satisfied on tsamba and butter tea year in and year out. Their queer foods must constitute a fairly well-balanced ration, however, for they thrive on them.

When the occasion and their economic status permit, Tibetans also eat meat. Especially is this true of the nomads liv-

Photograph by Dr. A. L. Shelton

BANDIT BRAVE OR TIBETAN TROUBADOUR?

The horseman is making a circuit of the walls of a ruined lamasery at Batang. This monastery was once one of the most flourishing establishments in eastern Tibet, but was destroyed by the Chinese during one of their invasions. The Tibetans are not allowed to rebuild damaged lamaseries or to erect new ones, for the Chinese conceive these religious communities to be centers of rebellion.

ing far from the grain-producing valleys, to whom tsamba is a luxury. The meat is sometimes dried and preserved for future cooking, sometimes cooked while fresh.

FIRST USERS OF CONDENSED MILK

Most Tibetan meat eaters, however, are kindred spirits of Dr. Samuel Johnson, for, like him, they prefer their meat "high" and "gamy." But, after all, they go much further than the author of "Rasselas," for they eat the spoiled meat raw. Naturally, stomach trouble is rife among the Tibetan nomads.

The Tibetans of this region were probably the original users of condensed milk in the form of dry lumps, for they have prepared this article of food for many centuries. Fresh milk is poured into a churn which is never washed and the liquid therefore curdles almost the instant it comes into contact with the germ-incrusted walls of the container. It is then churned and the butter is extracted.

After the butter is extracted the milk is boiled in a large iron pot until it reaches the consistency of thick syrup. It is then poured out in a thin sheet and allowed to dry, after which it is broken into small pieces and stored. The lumps often become as hard as stone, and to eat them dry is out of the question. The nomads solve the problem by substituting the dry milk for tsamba, soaking it in their butter tea. It thus becomes softened to some extent and can be chewed.

The pastoral Tibetans produce a great deal of butter. Much they consume themselves, but there is a considerable surplus, which those in reach of the grain-producing valleys take to the lowlands and exchange for tsamba. There is such a quantity of yak hair in the butter that an observer would almost assume that it was a prized ingredient, but its presence does not lower the value of the product in the estimation of the native consumers.

Salt is so important to the Tibetans that in some parts of the country it is a medium of exchange. Its production constitutes an industry of considerable consequence in some of the valleys of the eastern border region, particularly at Yengin, where salt water may be obtained from shallow wells.

SALT WATER IS EVAPORATED ON MUD ROOFS

Flat roofs of mud, beaten on to a carpet of small poles supported by larger poles, are constructed. Along the edges raised rims are built. The beating or puddling makes the mud surfaces practically impervious to water. Women carry kegs of salt water on their backs to the roofs, climbing up notched poles that serve as ladders. The water is poured on the flat surfaces and evaporated by the wind.

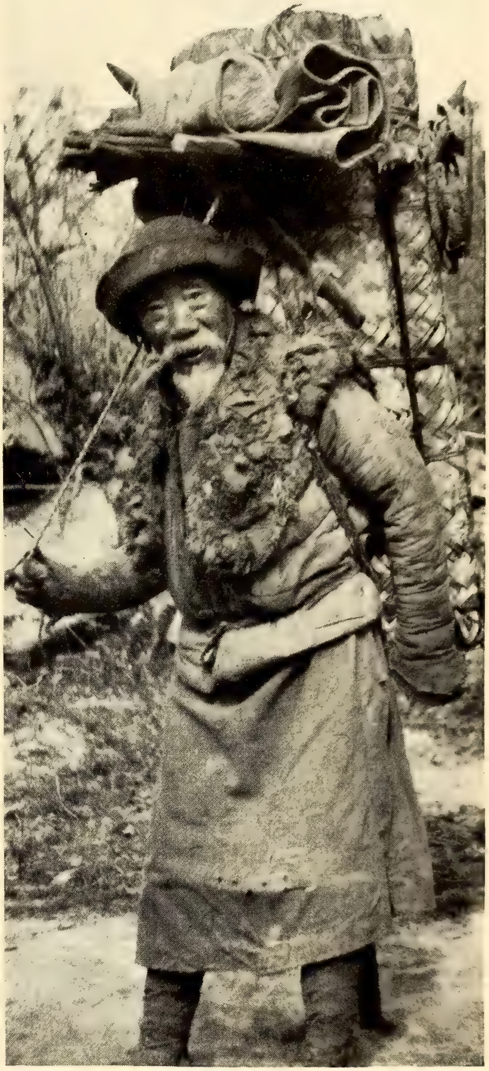
After the water has disappeared the thin film of dry salt left on the roofs is collected, but not, it should be added, without considerable quantities of dirt and grit which are swept up with it.

Apparently the natives do not object to the dirt, for the salt, as it comes from the roofs, is carried as an article of commerce all over eastern Tibet. It is very cheap at the wells, but becomes progressively dear as the distance increases. In the remote districts the price of the salt becomes almost prohibitive and it is eagerly sought after. The salt produced near Batang is used by the staff of the American mission, but the precaution is taken to refine it by dissolving it, allowing the tiny stones and mud to settle, and boiling down the clear salt solution.

"ONE PERSON, ONE GARMENT"

The Tibetans are almost wholly independent of the outside world in the matter of clothing materials, and this is especially true of the nomads and village folk. The great majority of the nomads wear garments of raw sheepskin. Nor is their wardrobe more extensive than the variety of its materials. The usual rule is one person, one garment.

The sheepskin garments are made with the wool inside. A single garment will last for years, and naturally in the course of time comes to have other inhabitants than its owner. In warm weather the wearers of the sheepskins throw the top part of the garment off and go about naked to the waist, or, removing one arm, permit the skin gown to hang from the other.

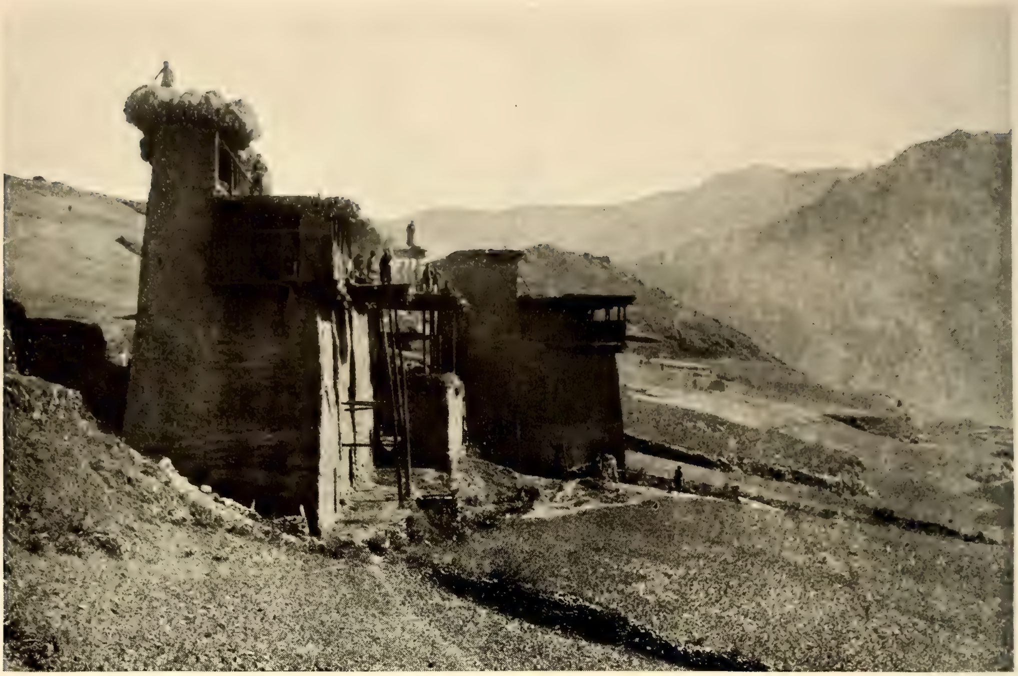


Photograph by Dr. A. L. Shelton

HE IS 78 YEARS OLD, BUT HE IS CARRYING 100 POUNDS OF TEA FROM YACHOW TO TACHIENLU, SZECHUAN

Sometimes as much as 280 catties (370 pounds) are carried across these mountain passes by a Chinese coolie. Often boys 12 to 15 years old are seen carrying as much as 75 pounds for days at a time.

The women among the nomads spin the wool from their flocks on a rude spin-



Photograph by Dr. A. L. Shelton

TIBETAN HOUSES IN THE ROBBER-INFESTED BAD LANDS

These homes are built primarily for protection. With the exception of the main entrance, there is no opening until the third story is reached. This style of architecture greatly simplifies the problem of defense against marauders.

ning-wheel. This is little more than a small disk of wood fastened to an upright, the whole being twirled with thumb and finger.

The wool, which is fastened to the end of the upright, is thus twisted into thread; the thread is then woven on a crude loom into very heavy woolen cloth about six inches wide. From this cloth, purchased with tsamba and barley meal, the people of the lower valley, where the climate is not so cold, make their gown-like garments.

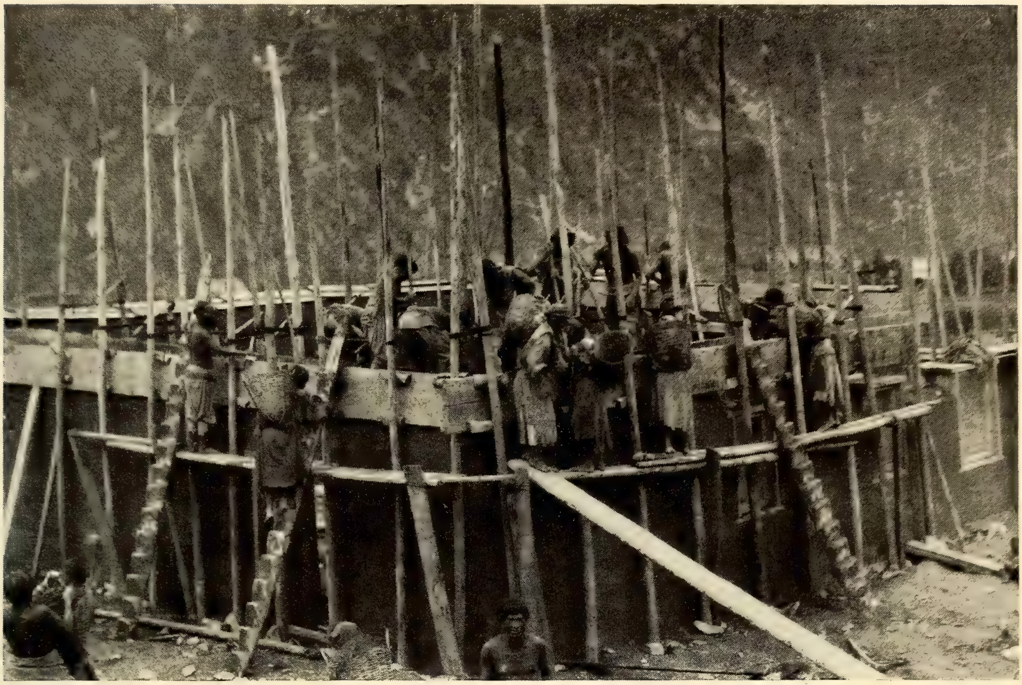
It is by no means easy to judge the financial status of a Tibetan by the kind of clothes he wears. One may see men dressed in rough sheepskin, with their hair hanging in tangles down their backs and their appearance indicating that they had never had a bath in their lives, bargain for something worth hundreds of dollars.

If such an individual decides to purchase the article, he will pull out of his dirty gown a leather bag of gold dust and unconcernedly weigh out a sufficient quantity of the shining powder to pay for it. Less uncouth purchasers will probably use in their transactions the rupees of Chinese mintage, which constitute the most generally employed medium of exchange in Tibet. Chinese brick tea, like salt, is also used in some sections in place of money.

MONOGAMY, POLYGAMY, AND POLYANDRY FLOURISH

The marriage customs of the people of Tibet present a peculiar combination of monogamy, polygamy, and polyandry—the last particularly characteristic of the country, though monogamy is actually the prevailing system. Under the polyandrous system, the eldest son of a family marries a woman and she becomes the common wife of himself and his brothers.

Polyandry is far more common, especially among the nomads, than one is likely to believe at first. Under this system a woman usually marries three or four brothers, but one case came under



Photograph by Dr. A. L. Shelton

A TIBETAN HOUSE IN THE COURSE OF CONSTRUCTION

Poles are used to hold together parallel boards, between which mud is puddled. Then the forms are raised and another layer of closely packed earth added. Similar methods are used from Shanghai to Russian Turkestan (see text, page 299).

my observation in which a woman had six brothers for husbands.

Under the ordinary arrangement, one husband will take care of the home in the valley, if there is one; another will be in charge of the yak or sheep in the uplands; a third will be the trader, taking care of the caravan, while others will be assigned special duties.

MULTIPLE HUSBANDS AND WIVES DWELL IN HARMONY

The oldest brother is considered the father and the other brothers the uncles of the family. In such families the children usually are not numerous, an average family of children being three to five.

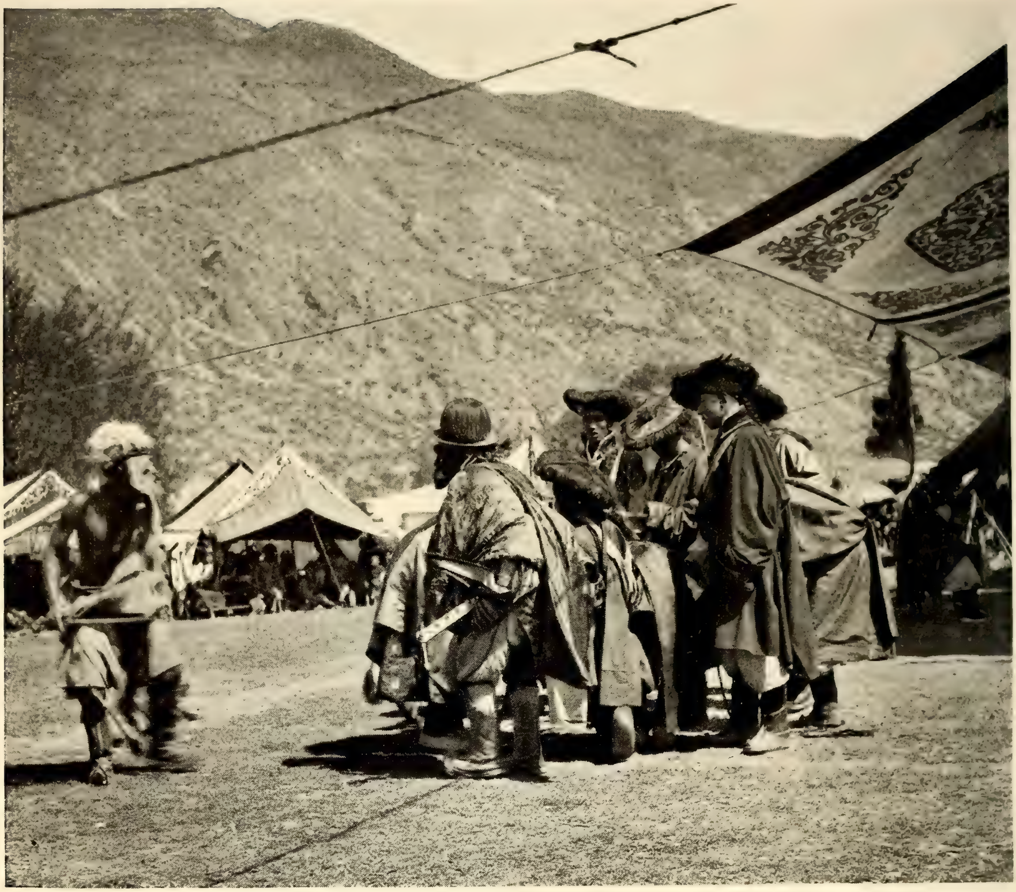
If a family has no sons, but has daughters, one of them usually is kept in the home, and a husband is brought in for her and carries on the family succession. The remaining daughters are normally given to other families. In a few cases, however, where there are two daughters, one husband is brought in and a polygamous household is established.

It is surprising how well the families of multiple husbands and multiple wives get along together. One with Western ideas would imagine that there would be a great deal of ill feeling and fighting, but in both polyandrous and polygamous families the members seem to live together in peace and harmony.

The usual feeling in these households is exemplified by the following incident: While on a journey in the border country I was called one night, by some folk in a village where I had put up, to see a man who was ill. When I told them that the sick man was dying, both the other husband, who was a brother, and the common wife cried bitterly.

THE WOMAN IS HEAD OF THE HOME

As opposed to the usual harmony in polyandrous households, I knew of one case the moral to which seems to be that all the husbands should belong to the same race. In this case a Chinaman and Tibetan went into partnership with one wife. For a while all seemed to go well, but finally the Chinaman became dissatisfied and chased the Tibetan out.



Photograph by Dr. A. L. Shelton

A SCENE IN THE TIBETAN PLAY WHICH IS GIVEN EVERY FALL AT BATANG

The performance occupies four days. During the festivity people from all parts of the country lay aside their usual labors and come to enjoy the outing. Every one is free to attend, but those who are able to do so are expected to make presents, either of money, meat, flour, grain, butter, or any other useful article, to the group of players for that year. The plays are historical in character.

Woman, on the whole, occupies a better position in Tibet than in a great many of the Eastern countries. She is practically master in the home and usually all transactions of a business nature concerning the family must have her sanction. Nor is she confined and prevented from going out as she pleases.

Once while I was traveling in what we have christened the "Bad Lands," to the west of Batang, I observed a custom I had not met with in any other part of the border country, which illustrated the privileged character of the Tibetan wife. In that region, after a woman marries and goes into the home in which she is to live, no other woman is permitted to go inside the door. If she wishes to visit with any of the neighbors or they with her, the visiting must be done outside the houses.

ONE PERSON IN SEVEN IS A LAMA OR PRIEST

Any reference to the social institutions of the Tibetans would be incomplete without mention of the lamas. They are the monks or priests of Tibetan Buddhism and live in great monasteries called lamaseries. Nearly every family in the country has at least one son who is a lama. Fully one-seventh of the entire population of Tibet, it is estimated, live in the lamaseries, being supported, of

Photograph by Dr. A. L. Shelton

THE AUDIENCE AT AN HISTORICAL PLAY IN BATANG, TIBET

course, in the main, by the remainder of the population.

The lamas have acquired much money and land. They add to their incomes from contributions by lending money to the common people, renting them land, and in time of sickness and death giving medicines and saying prayers.

Some of the priests in the local monasteries are fairly well educated, according to the standards of the country, having spent some years in Lhasa at the great monasteries. After returning to their native homes they are looked upon as very holy men.

The towns of Tibet are in most cases small groups of dwelling-houses and a few shops in valleys at the foot of steps and winding paths leading to some monastery that towers above on the steep mountain side.

In the lamaseries is to be found whatever there is of art in Tibet, most valuable objects eventually finding their way into the hands of the priests, who on the death of a person may take much of his personal property in payment for prayers on his behalf.

The strong hold which lamaism, with its great privileges accorded to the priests, has upon the Tibetans is due to the fact that the inhabitants of this mountain-rimmed country are perhaps the most religious people on earth. Their faith is nominally Buddhism, but in reality it is more truly a veneer of Buddhism over the old Bon religion, a religion of devil-worship. They are exceedingly superstitious, believing in ghosts and in the daily interference of devils in their affairs.

One day the old man who taught me the Tibetan language came in limping. I asked the cause of his lameness.

"Why," said he, in a matter-of-fact way, "a devil just now hit me on the ankle out there and I sprained it."

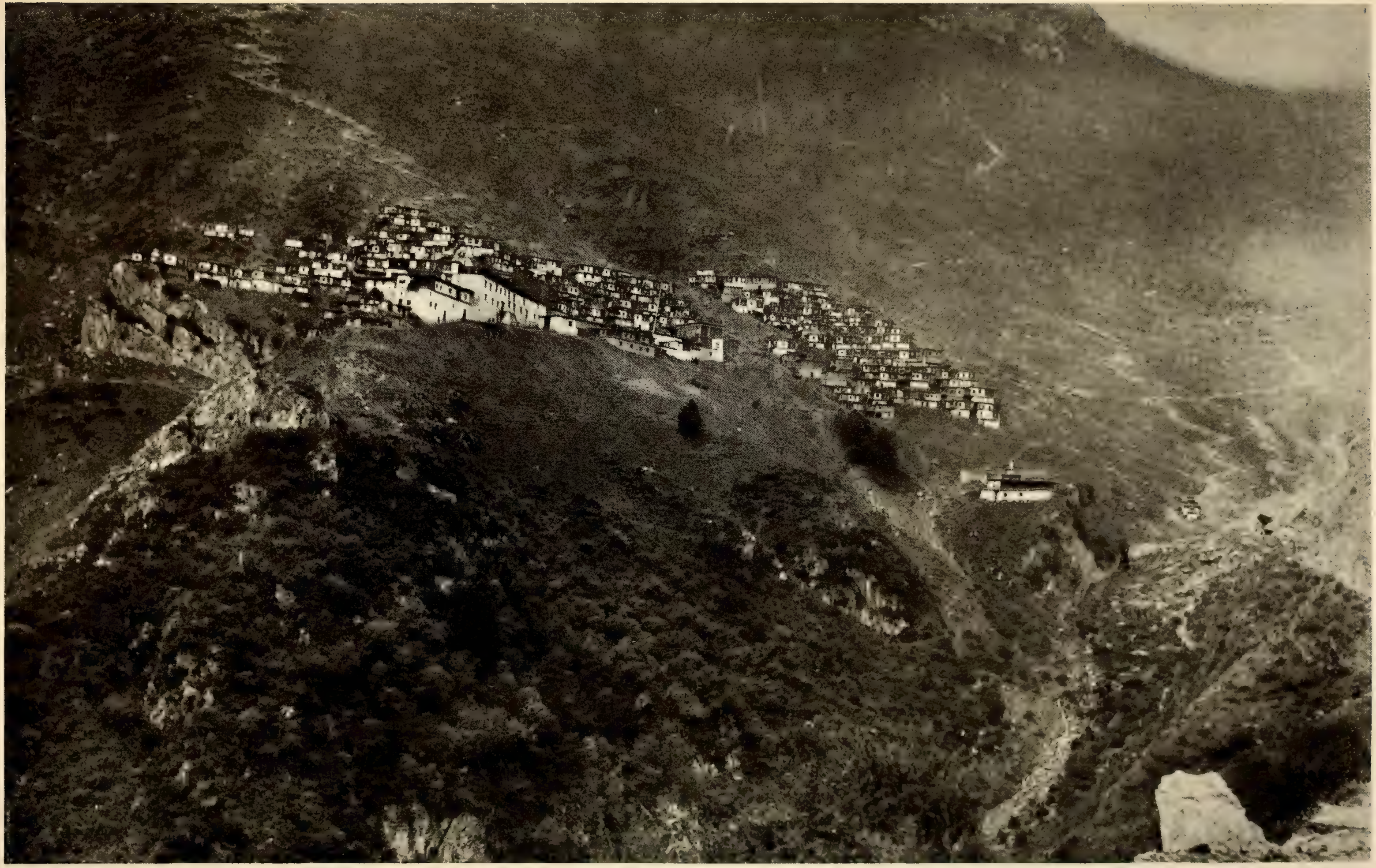
"Don't you think in reality you just stepped on a stone and turned your ankle," I said. "Wasn't that what hurt you?"

"Don't you think I know when a devil hits me?" he rejoined, with the tone of one defending the most obvious of common-sense statements.

In its form of government, Tibet is one of the few remaining theocracies in the world. The Dalai Lama of Lhasa combines in his person the functions of head of the lamaist church and supreme temporal ruler of Tibet. His chief governmental assistants are also priests.

The lamas, even the ordinary monks, occupy a privileged position, constituting in effect a class to themselves.

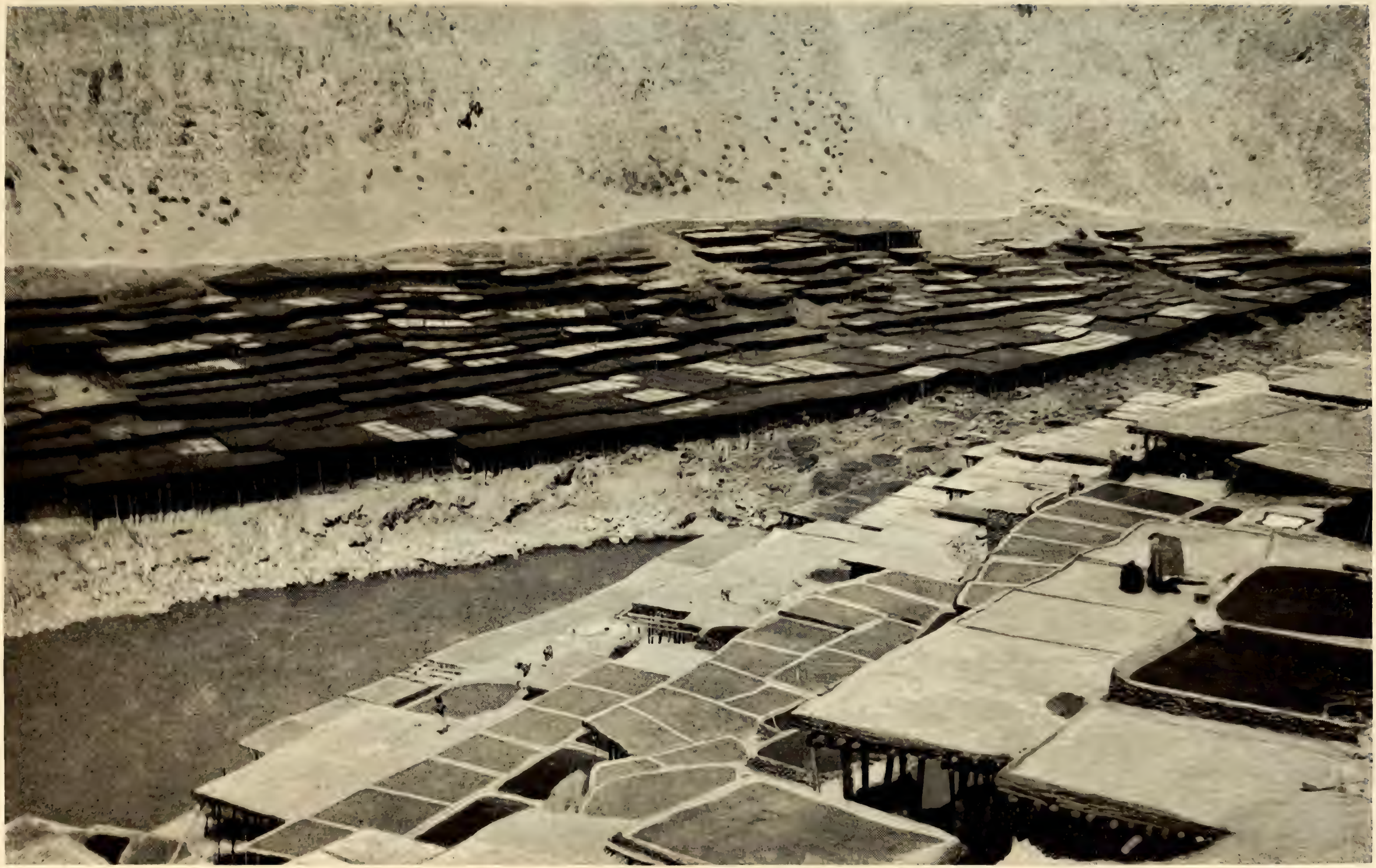
Next in rank to the ruling lamas are



Photograph by Dr. A. L. Shelton

GARTOK MONASTERY, WHERE THOUSANDS OF IMAGES ARE MADE AND GILDED FOR SALE

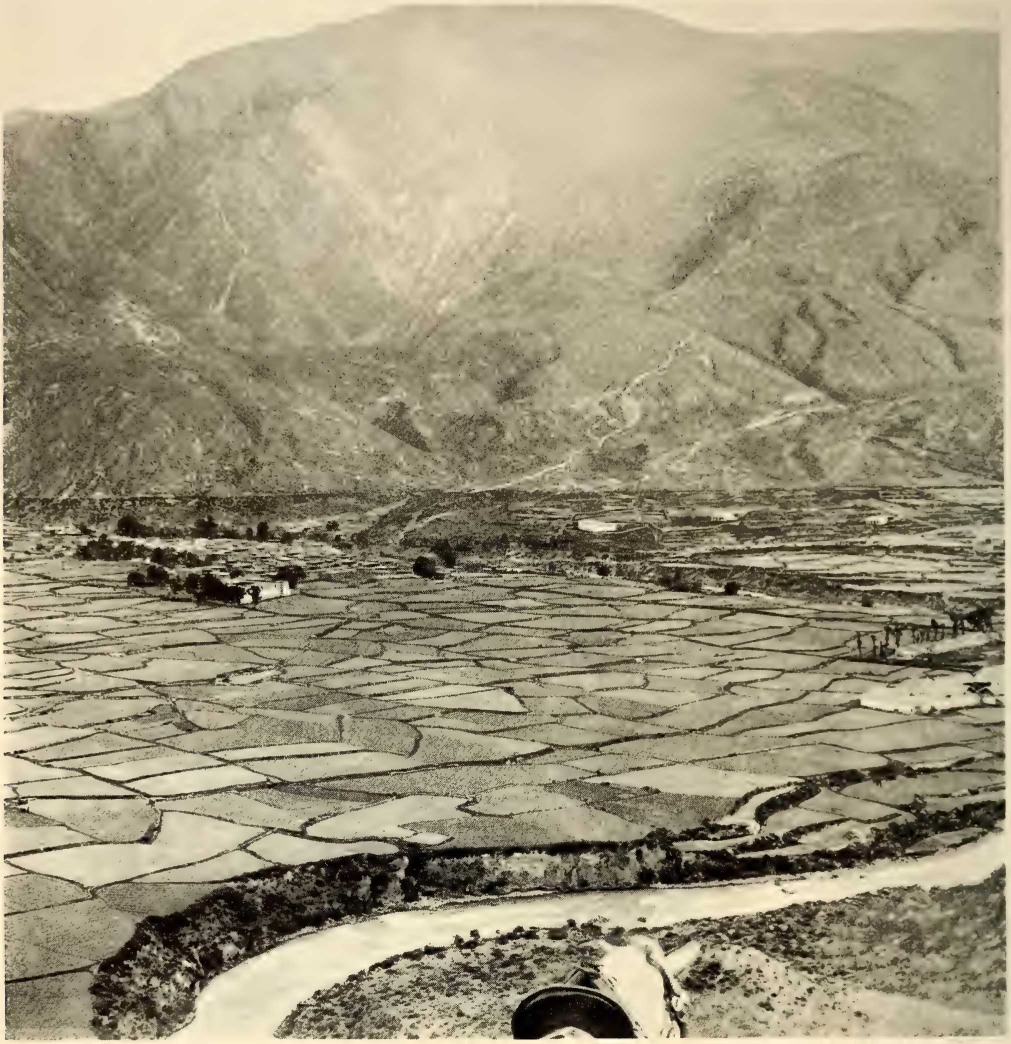
This home of idolatry is situated about nine days' journey from Batang. With their crude facilities the monks are unable to apply a cheap gilt to their idols, but are forced to use a rather heavy coat of pure gold (see page 319).



Photograph by Dr. A. L. Shelton

A VIEW OF YEN-GIN, FAMOUS FOR ITS SALT WELLS, WHICH HAVE BEEN PRODUCTIVE FOR HUNDREDS OF YEARS

Salt water from these wells is poured out upon raised platforms specially built to hold water. After the wind evaporates the water, the salt is swept up and sold with the dirt which is mixed with it. The white spots are platforms incrusted with dried salt (see text, page 305).



Photograph by Dr. A. L. Shelton

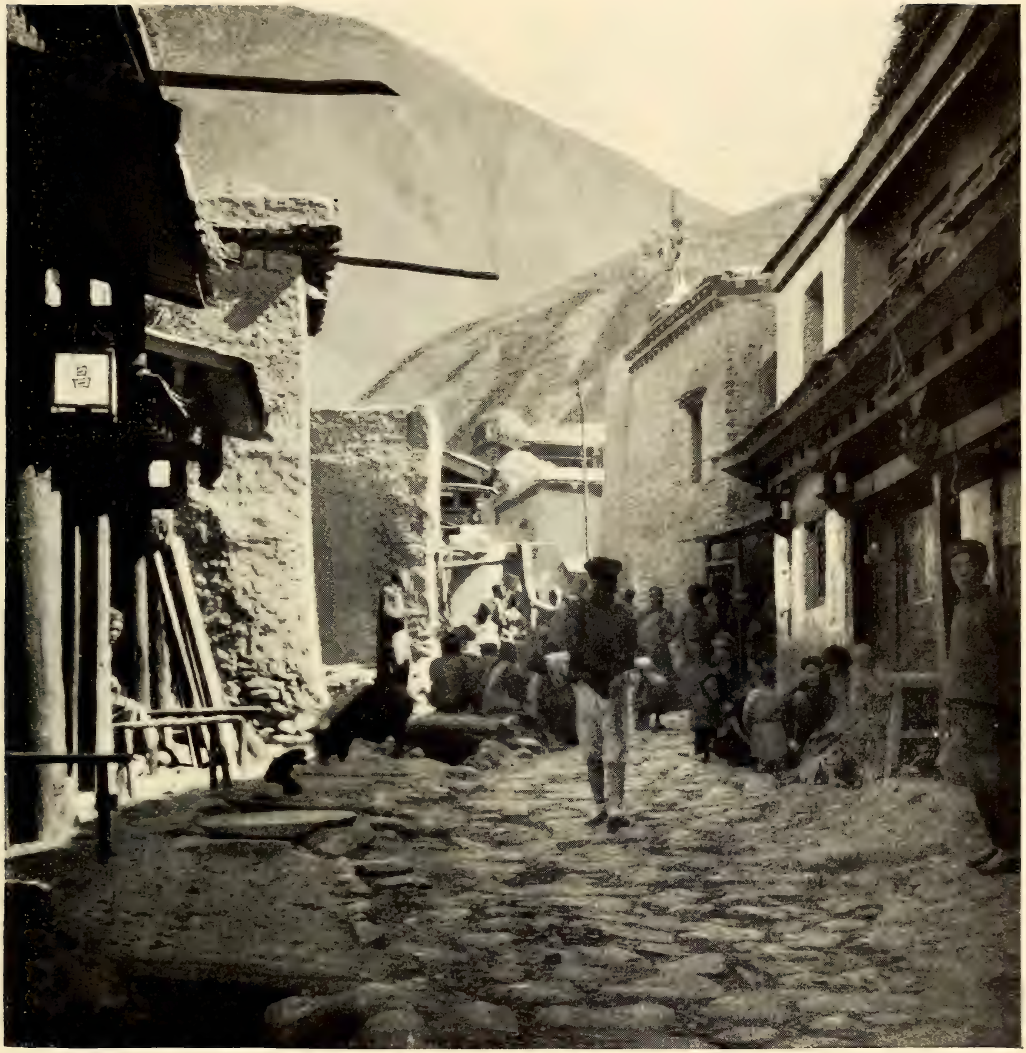
BIRD'S-EYE VIEW OF BATANG SURROUNDED BY TERRACED FIELDS

The white buildings on the hill are the hospital and residence of the American mission. Note the head of the horse in the foreground; the photograph was taken from the vantage point of its back.

the lay officials of the government. The next lower step in social gradation leads to the headmen of the villages, usually the wealthiest residents of the localities. Next in order are the wealthy villagers not headmen, and below these come the ordinary folk. At the bottom of the social ladder are the servants and slaves of the well-to-do.

PRAYER-WHEELS OPERATED BY WATER

In education the Tibetans are very backward, there being nothing in the country in the nature of public instruction. A few of the more wealthy families hire a priest to come into their homes to teach their sons. The "education" which these favored ones obtain, however, is usually of very little value to them, for a great many of the priests are not able to read or write, but have simply learned to say from memory long strings of prayers or the inevitable "Om-mani-padme-hum," the repetition of which is supposed to insure the laying up of great merit.



Photograph by Dr. A. L. Shelton

A STREET SCENE IN BATANG

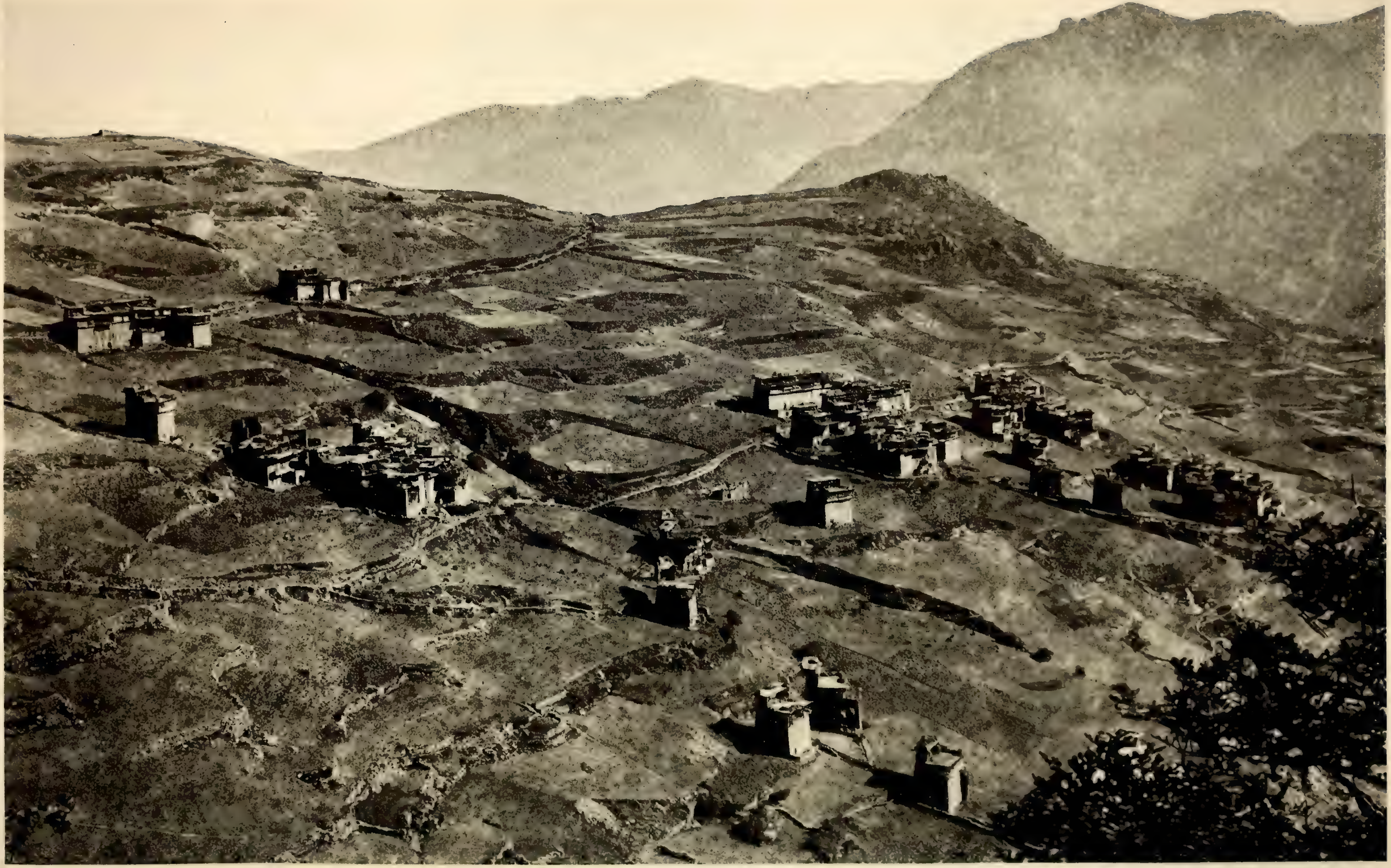
Batang, or Paanhsien, derives most of its importance from the Tibetan trade route, which passes through it on its way from Yachow to Chiamdo, connecting the Yangtze Valley with the highlands of Tibet (see map, page 296).

This sacred combination of sounds—a sort of religious abracadabra—is a thing on which the Tibetans and other votaries of lamaism rely for comfort in this life and for assurance of happiness after death, or to prevent their being reborn in a lower scale of life. It is said thousands of times a day by the faithful, as they go about their work. Often it is counted off on strings of beads.

The Tibetan Buddhists believe also that there is merit in "repeating" this magical formula mechanically. Accordingly it is written on yards and yards of paper which are placed in prayer-wheels. In most cases these wheels are twirled by the hands of the worshipers, but so confident are they of the efficacy of mechanical prayer that they construct what might be termed power prayer-wheels operated by water.

The very winds are harnessed to pray for the Tibetans, for the mystic phrase is written upon thousands of flags, which are strung upon poles and ropes. Windmills connected to prayer-wheels carry the mechanical prayer still farther.

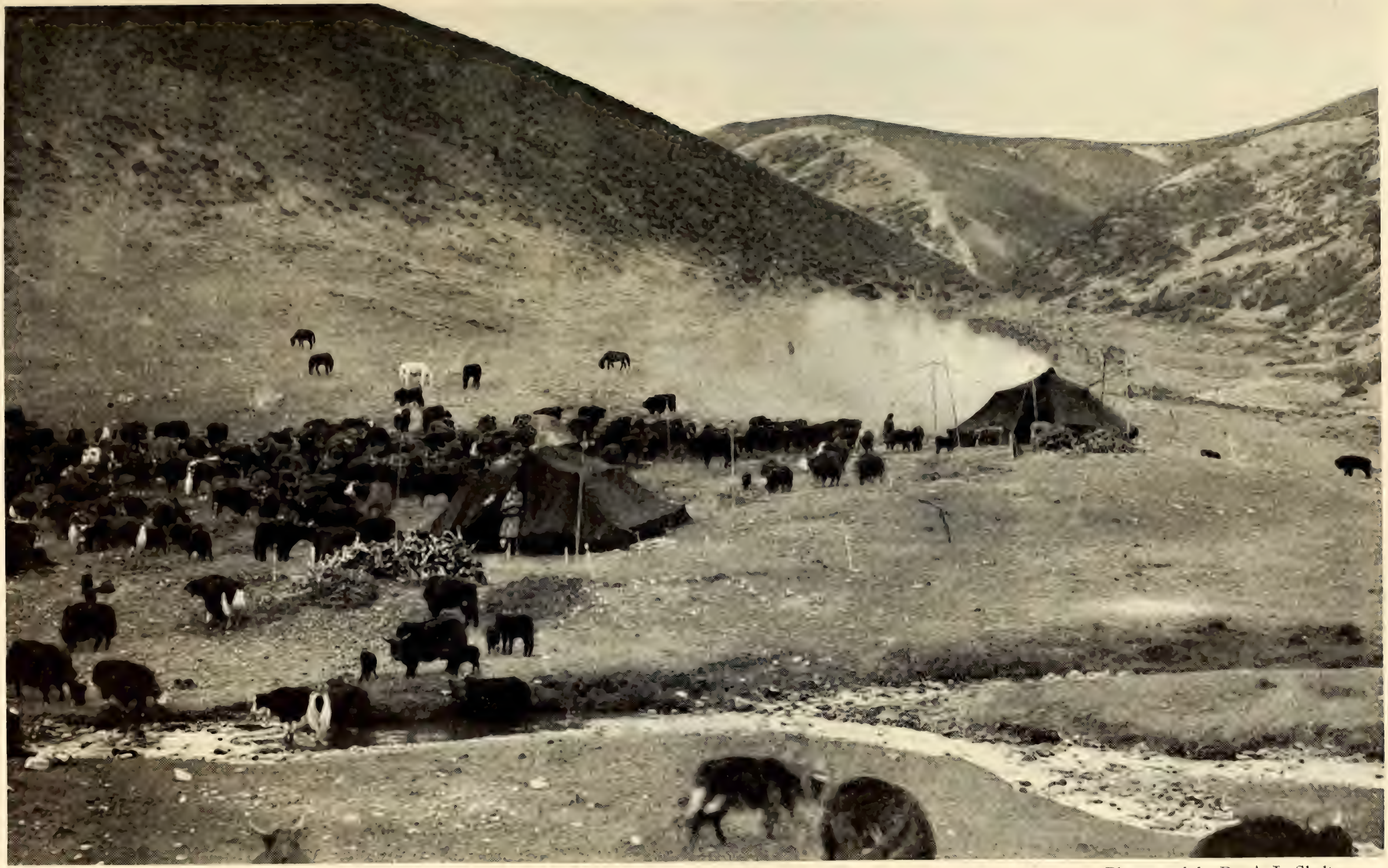
The sacred words are even carved on



Photograph by Dr. A. L. Shelton

A TYPICAL TIBETAN VILLAGE, SHOWING THE PECULIAR DISTRIBUTION OF THE HOUSES IN GROUPS UPON THE HILLSIDE

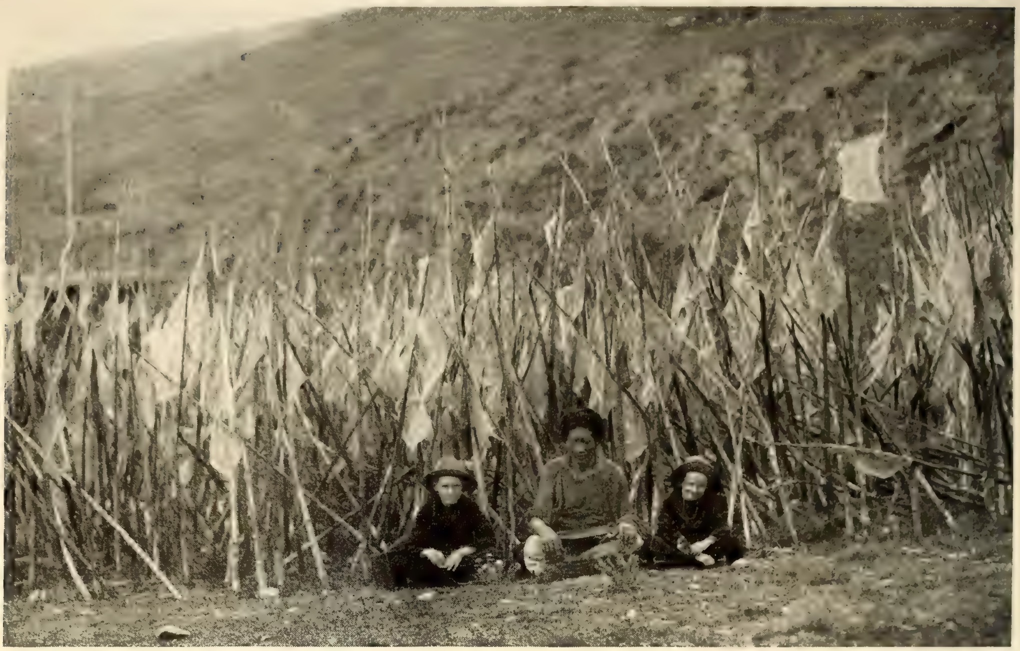
For a description of the Tibetan dwellings, see illustrations on pages 306 and 307 and text, page 299.



Photograph by Dr. A. L. Shelton

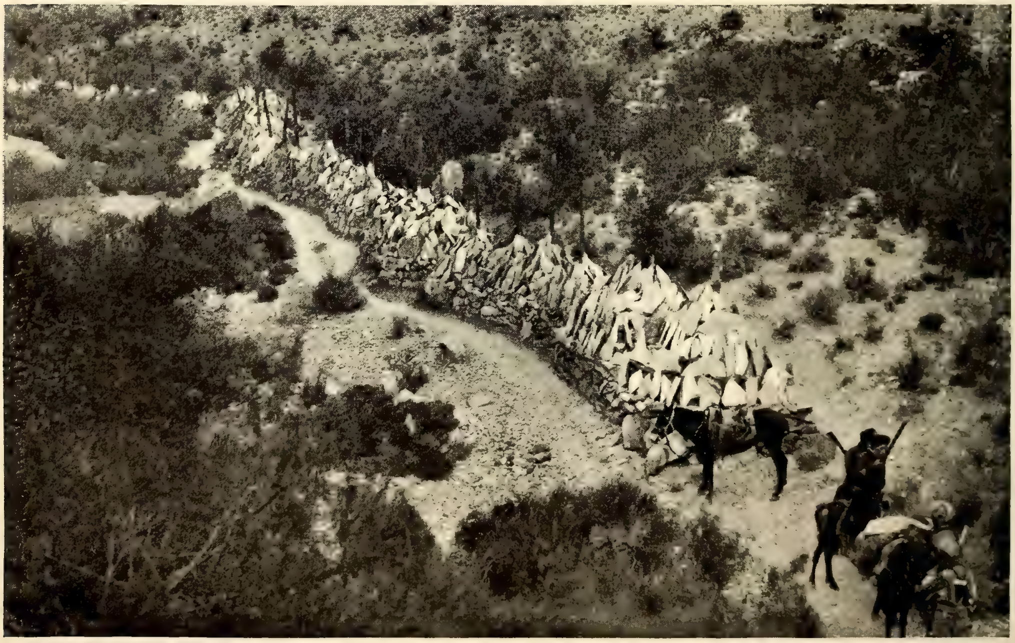
A CAMP OF NOMADS IN THE TIBETAN HIGHLANDS

These nomads change their camps from the valleys to the mountain heights according to the season of the year. In the spring they follow the new grass as it appears below the ever-receding snow-line. In the fall, as the snow-line descends again, they keep just below it with their herds of yak, until in midwinter they are in the lowest valleys (see page 298).



PRAYER-FLAGS SET UP NEAR THE GRAVE OF A PROMINENT TIBETAN

As the tinkling temple bells of Mandalay direct one's thoughts to unseen forces, so the Tibetan prayer-flags flutter in the wind, which bloweth where it listeth and is seldom still (see page 309).



Photographs by Dr. A. L. Shelton

WHERE PRAYERS ENCOMPASS THE EARTH

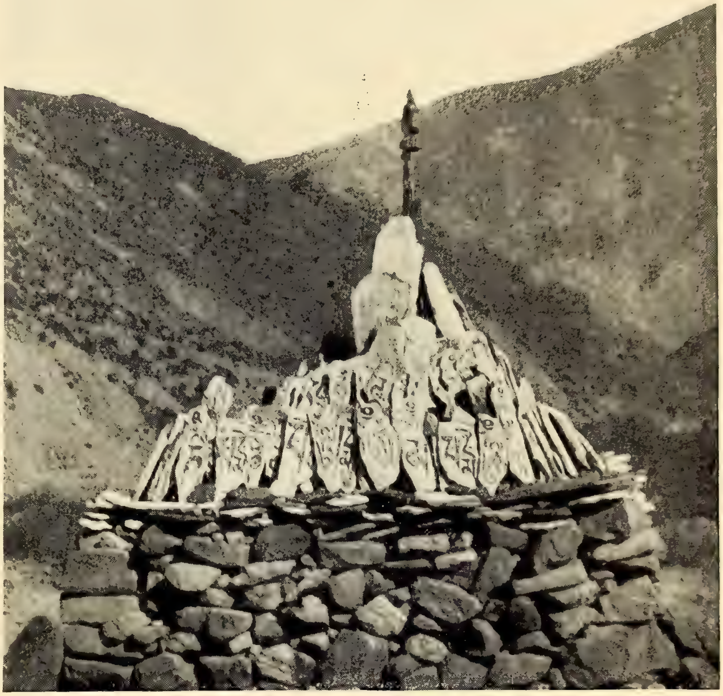
In Tibet, the land of mechanical prayer, the winds and waters are utilized in seeking the favor of gods and devils. Huge piles of stones, each inscribed with a prayer, parallel the trails and dot the landscape (see text, pages 309 and 312).

stones, which are placed in great piles along the roads. Some of these piles are many feet high and represent years of labor spent by priests in carving and placing them. In no place in Tibet can the eye or ear escape the omnipresent "Om-mani-padme-hum."

HUNTING THE MUSK DEER IS A DYING INDUSTRY

The country folk of Tibet, as the villagers and nomads may be called in distinction from the thousands of residents of the lamaseries and the few traders of the larger towns, engage in a number of minor industries in addition to tilling the soil and tending their herds and flocks.

In the past a considerable number of Tibetans have hunted musk deer, collecting the musk for export. Owing to the rapid decrease in the number of animals, however, the exports have fallen off markedly and the industry may be said to be a dying one.



Photograph by Dr. A. L. Shelton

SACRED MANI PILES OF CARVED STONES: TIBET

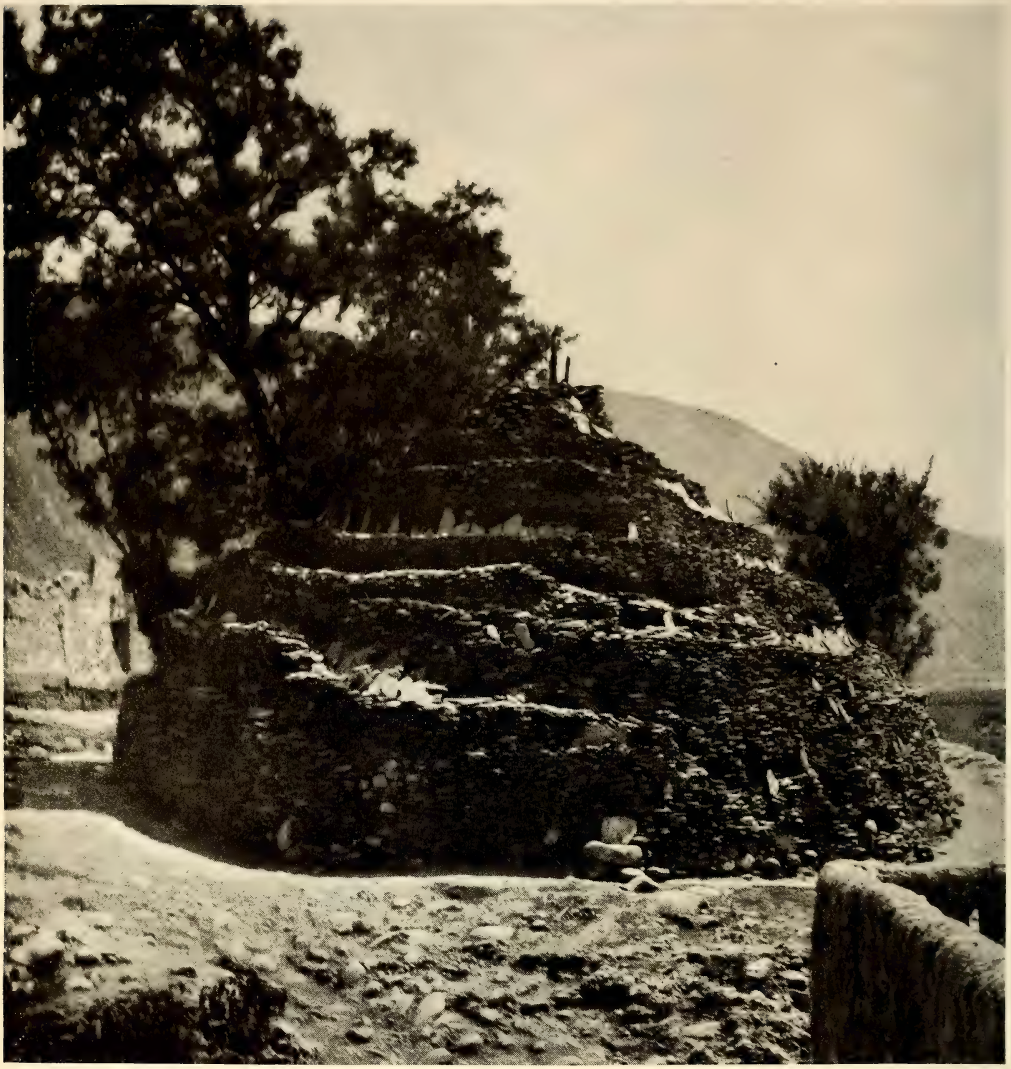
On these stones are carved the magic formula, "Om-mani-padme-hum." The Tibetans are unable to explain the meaning of this phrase, but the most generally accepted translation is "Oh, Jewel in the Lotus!" which has been analyzed as indicating an expression of reverence for the Dalai Lama. The lotus flower is symbolic of heaven, of heavenly birth (see text, page 309).

The methods employed have been largely responsible for the dwindling importance of the industry. The deer have been hunted ordinarily not with guns, but by means of snares set in the paths which they frequent. They are caught by the feet and swung completely off the ground. Although the musk is obtained only from the males, the snares, of course, catch both males and females.

Wonderful and awe-inspiring concoctions of Chinese medicine contribute much to the industries of the Tibetans. The collection of deer horns "in the velvet" is a case in point. Large numbers of deer are killed each June and July, primarily for the horns, which are then in the proper stage of growth. The horns are sold to the Chinese, by whom they are prized as one of the best tonic ingredients in all their pharmacopœia.

In the spring and summer months the Tibetans also dig plants and collect fungi and other articles of supposed medicinal value for export to the Chinese market.

One of these ingredients very highly prized by the Chinese is the grass worm. When dug it looks like a small plant a part of which is a worm. In reality it is



Photograph by Dr. A. L. Shelton

ONE OF THE LARGE MANI PILES NEAR BATANG CONTAINING COUNTLESS STONES ON EACH OF WHICH IS CARVED A MAGICAL PRAYER FORMULA

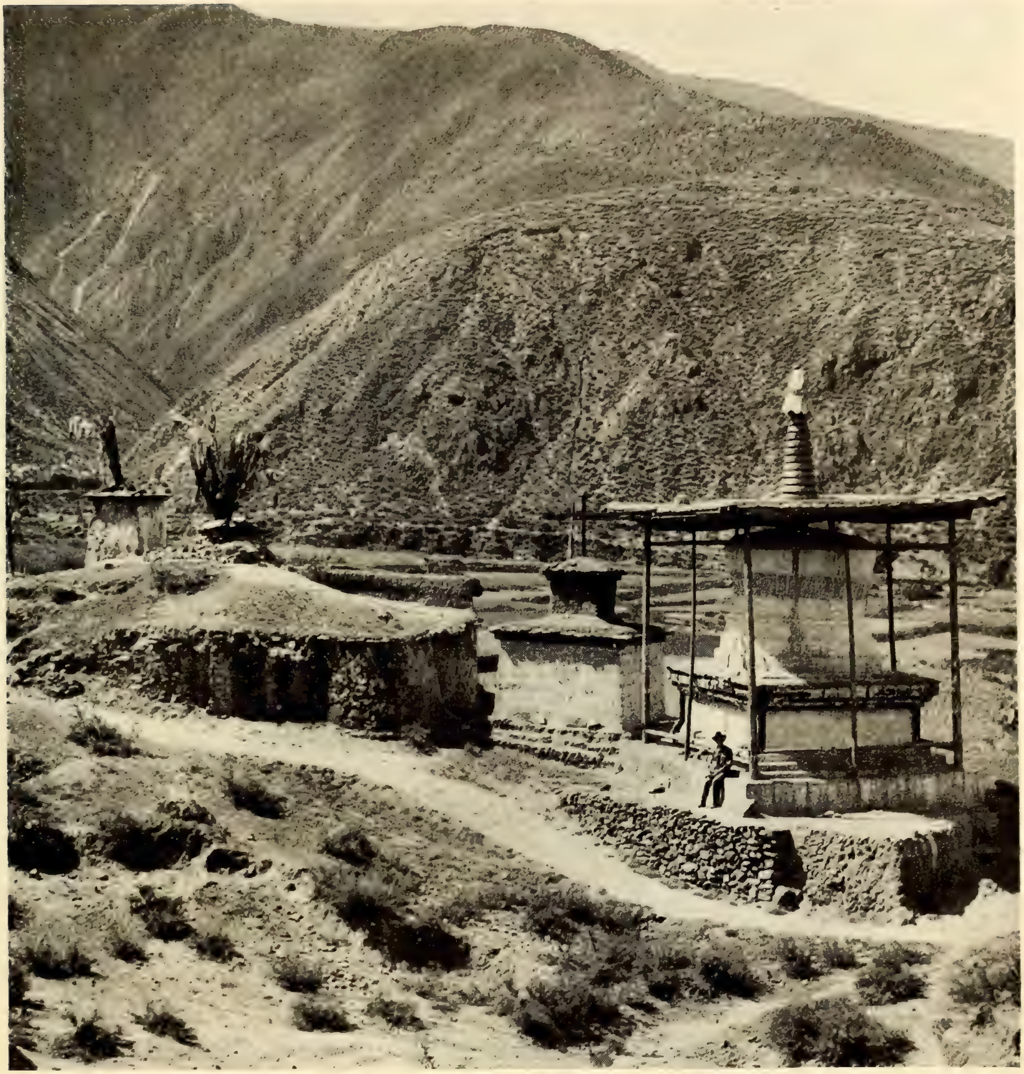
the remains of a grub which has been attacked by a fungus. The grub is killed by the fungus, the root of the latter, which is in the grub, absorbing its body. Only the outer husk is left in the semblance of the original grub. This seeming combination of animal and vegetable life is not only used as a medicine, but is also eaten as a delicacy.

METAL WORK AMONG THE TIBETANS

Some mining is carried on by the Tibetans of the eastern border region, but the industry is of small proportions. The products mined include lead, gold, and iron. Iron is used for swords, some of the most elaborately ornamented commanding a high price.

The Tibetans love to embellish their scabbards with silver, coral, and turquoise, and some of them are fine examples of workmanship. Iron is also used in the manufacture of crude guns, or was until within the last few years, when it became possible to obtain firearms of Western manufacture.

In Chiamdo, principal town of Kham, Tibetan workers in iron make of that



Photograph by Dr. A. L. Shelton

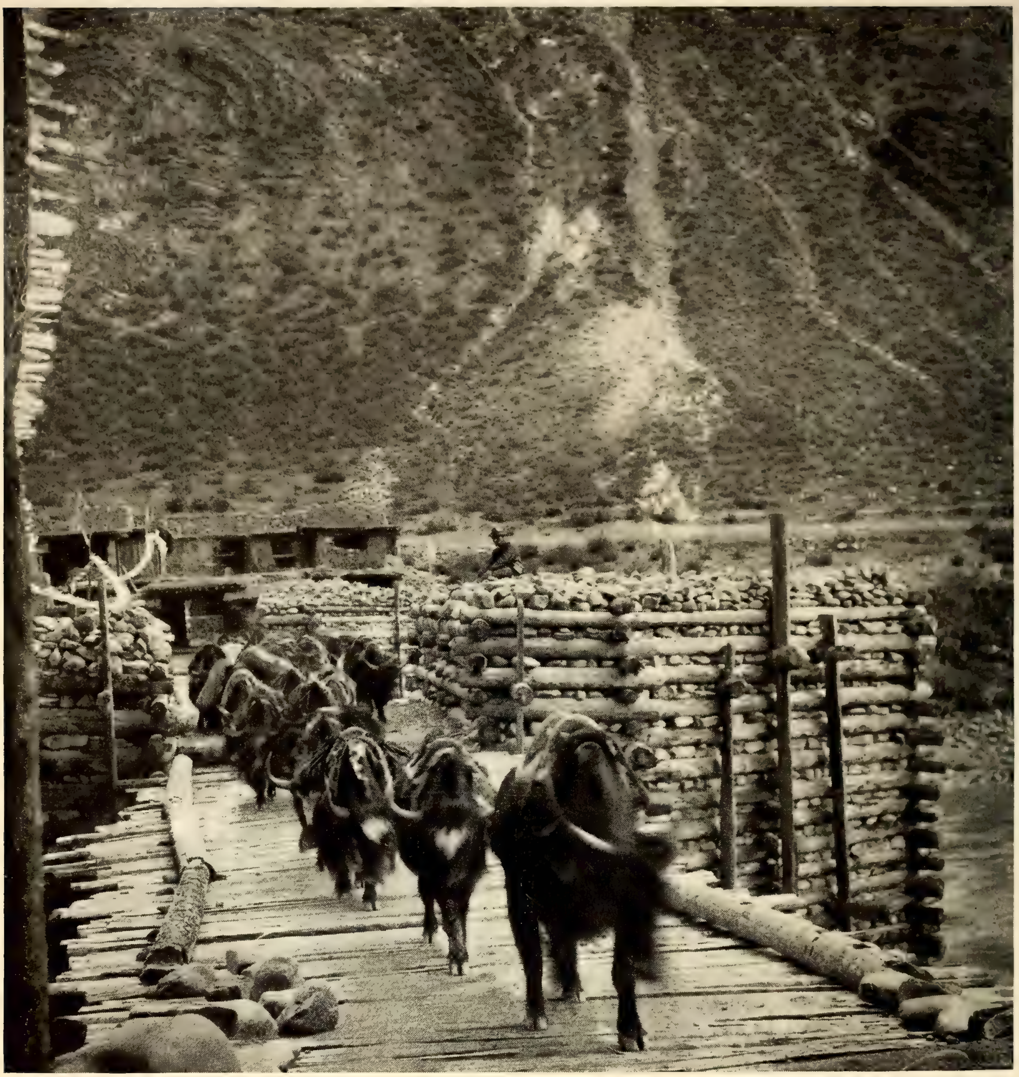
AN ELABORATE CHORTEN (SHRINE) NEAR BATANG

Chortens are a common sight in Tibet and the surrounding lands. In Peking there are large Lama towers similar to these shrines, which are built solid, though they may contain valued relics.

metal large wine flasks, which are much sought after throughout Tibet. I spent some time in Chiamdo in 1918 caring for the wounded, after the fighting in the border country between Chinese and Tibetans, and became well acquainted with the Galon Lama, stationed there. He is one of three Galons, literally "receivers of commands," who rank immediately below the Dalai Lama. This Galon was commander-in-chief of the Tibetan army, and while serving in that capacity had given up his ecclesiastical functions.

When I left the city he presented me with two of the famous hammered-iron objects of Tibetan handicraft, into which had been pounded figures in gold and silver. They are crude but very beautiful.

In some of the lamaseries of Tibet the monks make and gild idols for sale all over the country. The Gartok lamasery near Batang turns out thousands of the images. With their crude facilities, the monks are unable to gild the idols as it would be done by a modern Western



Photograph by Dr. A. L. Shelton

YAK CROSSING THE MEKONG RIVER ON THE BRIDGE AT CHIAMDO

Throughout the whole region of western China and eastern Tibet, bridges are few and primitive, the suspension type, ranging all the way from single ropes to heavy structures, being most popular (see illustration, page 302).

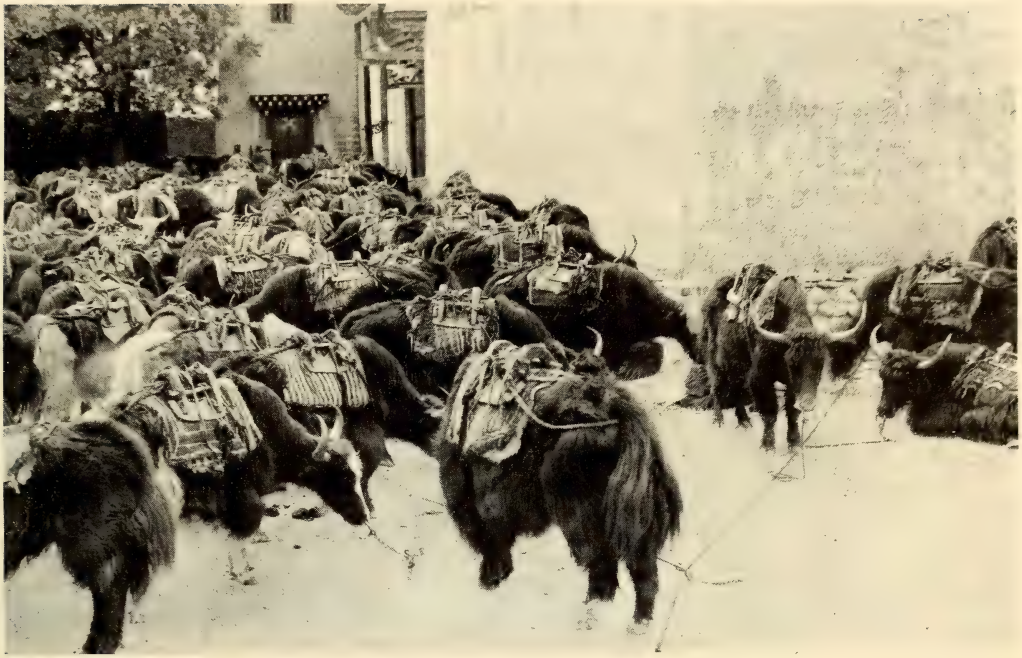
process, but must apply a rather heavy coat of pure gold. Because of this, the prices are high.

THE BUDDHIST BIBLE IS A 108-VOLUME WORK

At Litang, about a hundred miles to the east of Batang, where there is a large lamasery, and in the lamasery of Derge, about 200 miles above Batang, in the Yangtze Valley, the printing of religious books is an industry of importance.

The Kanjur, which is the Buddhist Bible, and the Tanjur, its commentary, each comprising 108 volumes, are printed at the two lamaseries from blocks on which characters are carved. The blocks occupy many large rooms and the printing of one set requires the work of many men for many days.

In Litang, until recently, there was a copy of the Tanjur which was written out by hand in gold and silver. The paper had first been lacquered with Chinese ink.



Photograph by Dr. A. L. Shelton

A YAK CARAVAN WAITING TO BE LOADED

The Tibetan yak is not only a reliable beast of burden and a provider of good beef, milk, and butter, but also furnishes a fine, silky hair which is woven into fabrics. The yak tail is used as a ceremonial fly-switch and is often represented in Indian sculptures.

The gold and silver fluids in which the characters were written were made by rubbing the precious metals on a rough stone and mixing the powder with glue water. It was one of the most perfect pieces of work I have ever seen. It was destroyed a few years ago by Chinese soldiers who understood nothing of its value.

As in most of the world's border lands at times, brigandage is rife in Kham, especially among the nomads. Bandits prey both upon other Tibetans and upon the caravans that pass between China and Tibet, and all travelers go armed.

WHERE FEUDS RAGE

Until a few years ago, the most formidable weapons employed in this part of the world were the old firelocks of local manufacture. More recently, however, many modern firearms have been introduced, with the result that the depredations of the outlaws are now much more serious.

Rough and but partly civilized as these people of eastern Tibet are, it is natural that their conceptions of personal and family honor should lead to the blood feuds that rage among folk of similar development throughout the world. A few years ago I had a particularly dramatic introduction to their custom of "halen," as they call their feuds.

I was on a mountain road about five days journey to the south of Batang and, with my traveling companions, was approaching a village early one morning. Before we came in sight of the dwellings we saw a large column of smoke rising. Hastening down the mountain side and through some woods, we found that the house of the headman was in ruins and was a mass of flames.

Soon we came upon a dead man lying in the road. Farther on was the body of a child, which had been run through with a bayonet. We came upon body after body of men and women—twelve in all.

The story of the devastation, which the excited survivors of the village finally told us, was this: Six or eight years before, the murdered headman had been a

Photograph by Dr. A. L. Shelton

UNTIL RECENTLY, BOWS AND ARROWS WERE IN USE AS WEAPONS IN TIBET, BUT THEY HAVE BEEN SUPPLANTED BY FIREARMS

The Tibetans of the Province of Kham spend most of their time out of doors and are a sturdy people. Games are uncommon, but there are many tests of strength, skill, and marksmanship.

leader in a party which, by command of some Chinese official, had exterminated another family. Twelve people had been killed. However, the party had not done its work with complete thoroughness, for one boy of about fifteen years of age had escaped.

This boy had fled to inner Tibet, had spent the intervening years nursing his grudge, and the night before, in company with some twenty or thirty friends, he had come to the village and had succeeded in killing twelve members of the headman's family.

By a strange coincidence, one boy of about fourteen years, belonging to the headman's family, had escaped by hiding in the ruined house. I afterward became well acquainted with this young man and found that he was living for just one thing—revenge.

IMPLACABLE ENEMIES, FAITHFUL FRIENDS

In Batang I know little boys who will undoubtedly be future victims of halen. They are playing together as they grow up, but in the course of time, unless they are willing to be disgraced in the eyes of their friends, they must become sworn enemies and attempt to destroy each other because of events in the past history of their families.

Although these people are implacable in their hatreds, they are no less faithful to their friends. Two years ago, during the time when I was acting as mediator between the Chinese and the Tibetans and attempting to arrange an armistice while the fighting was going on, I spent some two months in Gartok, Tibet, as the guest of the Tibetan governor; also there at the same time was Lozong, the head of a band of brigands, who had come to ask the governor to permit him and his followers to take Batang for him.

During our stay, Lozong and I became quite good friends, often visiting each other. One day he proposed to me that we should be brothers. According to this custom among the people of Kham, when two persons like each other very much they draw up an agreement declaring that they are brothers and that they will help and stand by each other through all things.

BECOMING A "BROTHER" OF A TIBETAN

When Lozong made the proposal I told him that I could not accept it.

"Why not?" said he, "we are friends."

"Yes," I replied, "I know we are good friends, but you occasionally kill people, and you rob, and you drink whiskey, and I cannot do these things."

He did not like that at all. He went away, but two or three days later he came back again.

"Well," he said, "if your religion will not allow you to become brother with me, since you say you came here to help people and not to kill them, what will your religion allow you to do?"

I told him something of our purpose and of our faith and he went away again. Two or three days later he came back, all smiles.

"I've got things all fixed up now," he said. "We can be brothers all right. I went up to the high priest this morning and took an oath that I will not kill anybody, that I will not rob, and that I will not drink whiskey."

I assured him that I was greatly pleased.

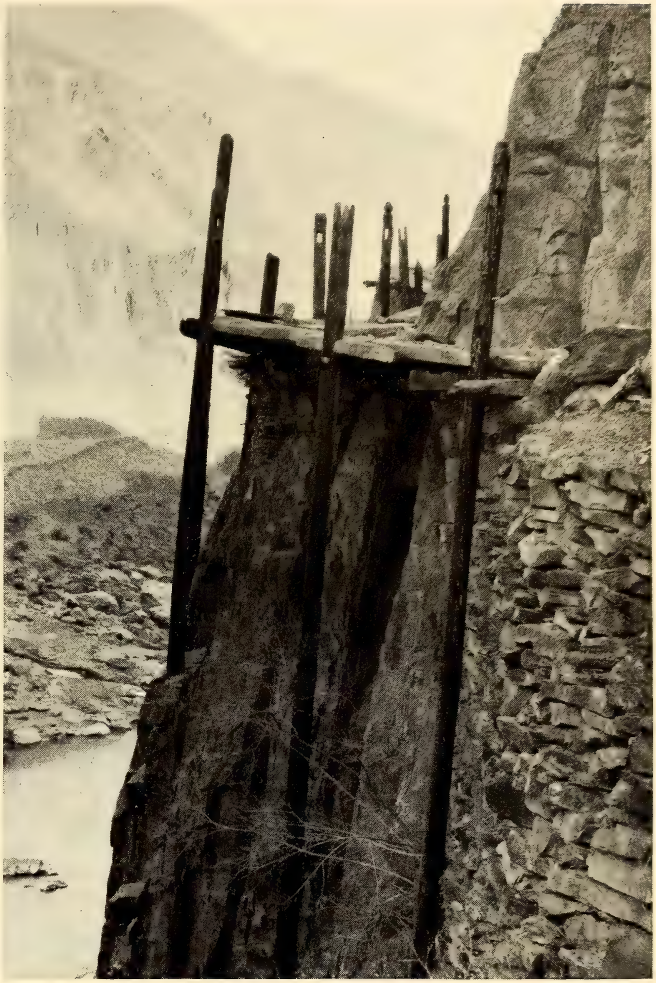
"Then," he said, as he reached inside his gown and pulled out a paper, "how is this?"

He had it all written out and proceeded to read the paper to me. It ran somewhat in this fashion:

"In view of the fact that General Lozong (he called himself General) and Doctor Shelton have both taken an oath that they will not kill anybody, they will not rob any one, they will not drink whiskey, they have decided to be brothers."

He enumerated several other conditions, and in closing said: "And, furthermore, this is to give notice to any one that if you ever molest Doctor Shelton in any way I will bring a thousand men and wipe you off the face of the earth."

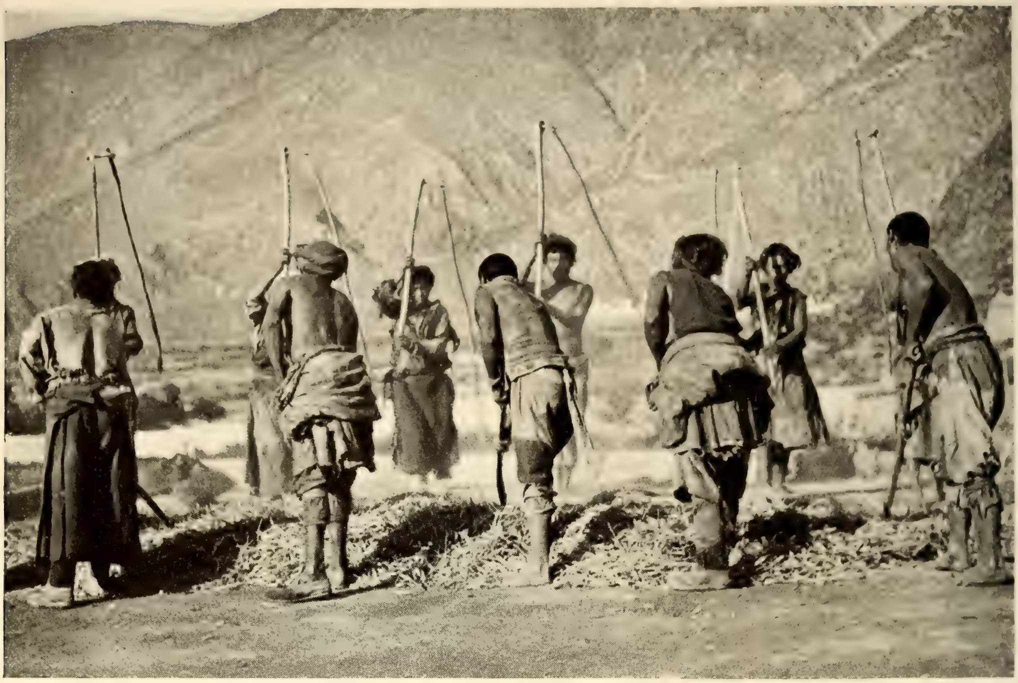
This paper is a pretty good passport in some parts of the country. And there



Photograph by Dr. A. L. Shelton

WHERE A FALSE STEP MEANS DEATH: ALONG THE MEKONG RIVER

Safety apparently is not an important factor in the calculations of the Tibetan highway engineer, but he is not lacking in daring, a trait which he assumes the traveler as well as the road-builder to possess. These roads are never repaired until they break down completely.



Photographs by Dr. A. L. Shelton

MEN AND WOMEN THRESHING WITH FLAILS ON THE ROOF OF A BATANG HOME

Threshing methods are primitive throughout the East; but, with primitive transportation methods and small fields, a modern threshing-machine would be useless (see text, page 299).

is a sequel to this experience. A year and a half later, just before I left Batang, I received a letter from Lozong from about two hundred miles to the south, in which, after asking about my health and that of my family, he said:

"This is to inform you that I have rigidly kept my oath of a year and a half ago."

That some conception of Western ideals is not beyond the people of Tibet was indicated on another occasion by one of their leaders, the Galon Lama of Chiamdo. During my stay in Chiamdo I had many talks with the lamaist prelate about religion, politics, and many other topics of interest. Mostly, though, we discussed religion.

We found that there was not a great deal of difference in some of the commands of our two religions, but naturally there were many things that we could not agree upon. On parting from him, however, I made him a proposition which I was delighted to have him accept.

"There are some things on which we cannot agree," I said, "but I want to propose this to you and see if we cannot agree to it: That from this day forth you and I will work together for the good of our brother men."

"I can accept that," he replied, "with my whole heart."

CAPTURED BY BANDITS

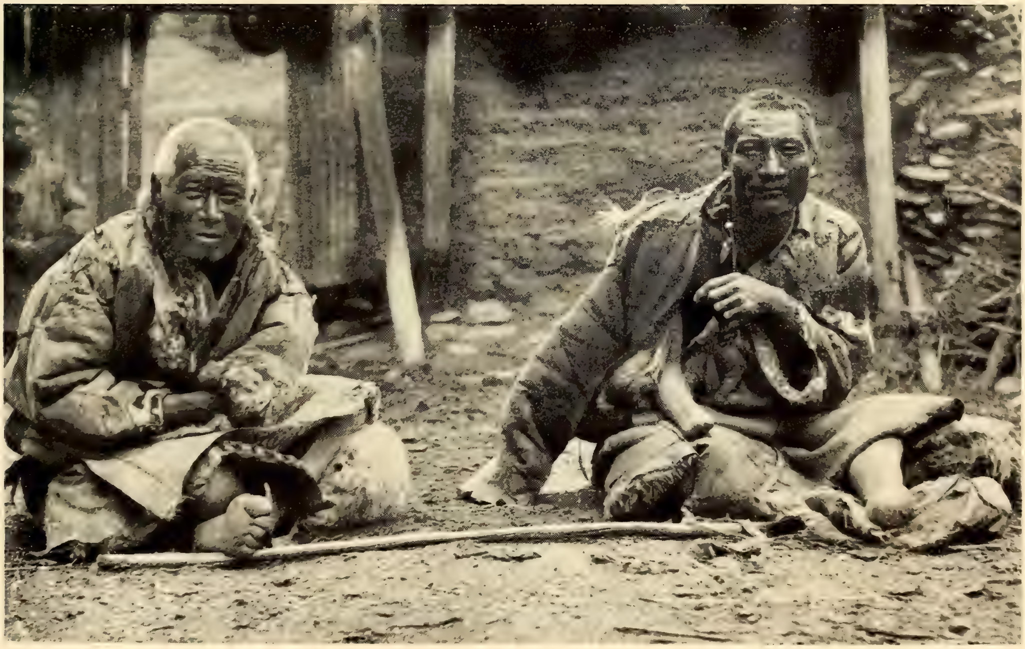
As a demonstration of his interest in philanthropy, the Markham Tigi, Governor of Lower Kham, assisted me in forwarding to the Dalai Lama at Lhasa a letter asking for permission to establish in the Forbidden City a hospital in which young Tibetans could be trained for medical work.

The Tibetan ruler sent a favorable reply, stating that, so far as he was concerned, he would be very glad to have the work undertaken in Lhasa, provided there were no foreign treaties to prevent.

It was my intention to establish the hospital without delay, but during a preliminary journey to the coast of China I was captured by Chinese bandits and received injuries which necessitated a trip to America. The establishment of a hos-

A CAULDRON WHICH HAS BEEN USED BY THE CHINESE FOR COOKING TIBETANS

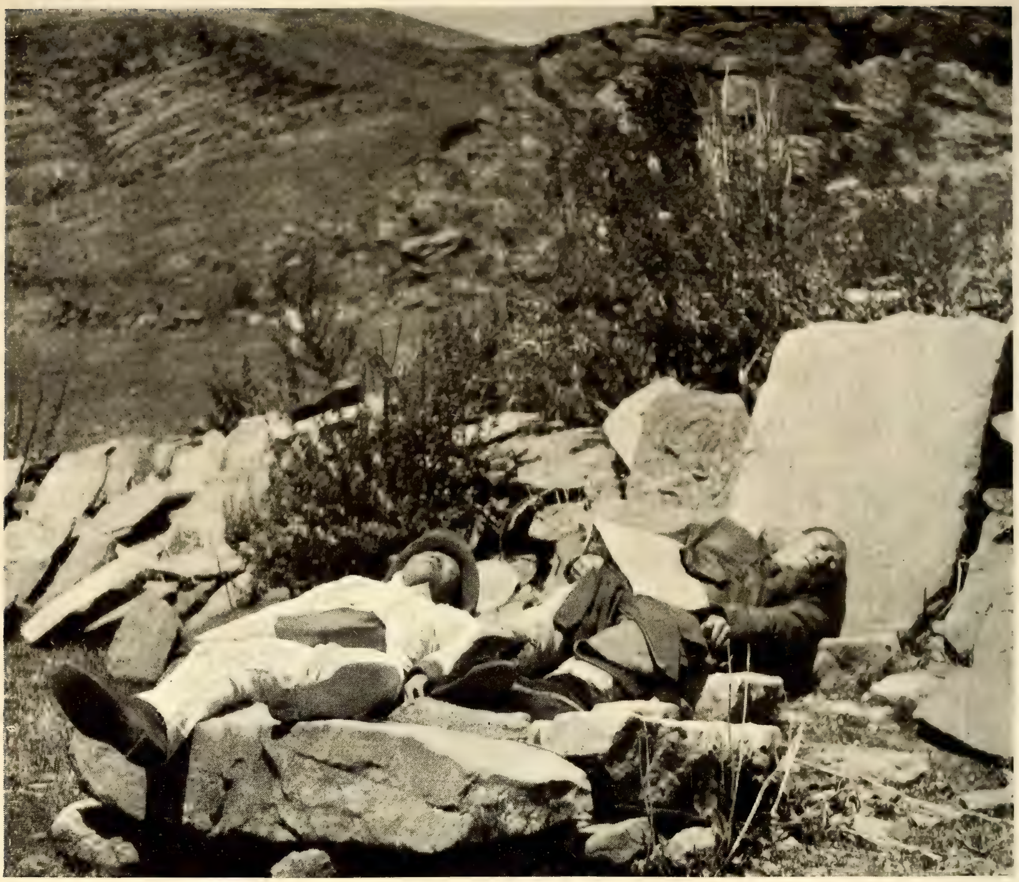
Lovers of peace, haters of war and militarism, the Chinese are capable of extraordinary barbarities, which seem as natural to them as holding a chisel with their toes.



Photographs by Dr. A. L. Shelton

VARYING PENALTIES FOR LARCENY IN TIBET

One hand and one foot of the culprit at the right have been cut off, while the lesser offender, at the left, has been deprived of a hand only. Sometimes both hands are amputated.



Photograph by Dr. A. L. Shelton

A TIBETAN CEREMONIAL ALTAR ON WHICH DEAD BODIES ARE LAID PREPARATORY TO BEING DISMEMBERED AND FED TO VULTURES

The two men shown in the illustration are only posing to show how the bodies of natives are ordinarily placed.

pital in Lhasa has been delayed, but it is my intention to carry the project through eventually.

The Tibetans have been making great strides in the last few years, especially since the Younghusband Expedition in 1904 and 1905. Far from making them antagonistic to Westerners, this contact with the outer world has done more to break down prejudice and to give them a thirst for knowledge than all previous events in their circumscribed kingdom.

The treatment accorded the prisoners and populace by that expedition have become renowned all over Tibet. I met one of the captains who was wounded at Gyantse. He said to me in apparent astonishment:

"Do you know that after I had been wounded I expected that they would kill me, but when they got me they didn't kill me at all. They took me and put me to bed and put medicine on my wound. They fed me and took care of me, and at last, when I got well, they not only let me go, but gave me a little money to get home with."

This man swears by the English.

During my stay in Chiamdo I met one man who had been in several of the capitals of Europe. The captain who was deputized to attend me had a son in London studying. Several officials had sons or relatives in India in the schools.

The fact that thirst for a knowledge of the world is making itself felt in Tibet argues well for the future of its virile, though socially undeveloped, people.

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OVER TRAIL AND THROUGH JUNGLE IN ECUADOR

Indian Head-Hunters of the Interior an Interesting Study in the South American Republic

By H. E. Anthony*

With Illustrations from Photographs by the Author

ECUADOR is a land of great interest to the northerner, whether he be scientist or layman; or whether his inclinations lead him to a study of peoples, their customs and traditions, or to the enjoyment of the natural features of the country—the birds, the mammals, the magnificent forests and lofty mountains.

This republic occupies a unique geographical position, astride the Equator, where it extends approximately from one degree thirty minutes north latitude to almost five degrees south latitude. Within this comparatively short distance are included some of the grandest of the Andean peaks and a multitude of mighty ranges and deep cañons.

On the west coast, Ecuador holds a strategic position in regard to the Humboldt Current, that chill invader from southern seas, for it is at this point that the current sheers off to the westward and its influence upon the winds and the climatic conditions of South America is weakened.

The eastern boundaries of the republic lie across Amazonian drainage, and cut the Napo, the Pastaza, and the Paute, all affluents of the world's largest river.

The topography is extremely mountainous. Although there are restricted plains in western Ecuador, the greater part of the republic lies along the Andes and their foothills, so that level areas of any great extent are seldom encountered.

The drainage of the country includes a number of large rivers flowing to the eastward, as well as several important western-flowing streams.

Except for a narrow coastal strip, Ecuador receives abundant rainfall. The year is divided into two seasons—the dry season and the wet, or so-called rainy, season. The rains generally begin in December or January and last until May or June, the balance of the year having only a scanty rainfall.

In some localities there is a deviation from this order, and on the eastern slopes of the Andes there are heavy rains in every month of the year. The annual rainfall in some parts of the *Oriente* may reach as high as 150 to 200 inches.

ECUADOR'S JIVAROS ARE HEAD-HUNTING INDIANS

The population of Ecuador is made up of three distinct elements. Most of the educated, upper class are of Spanish descent and all of the political offices are

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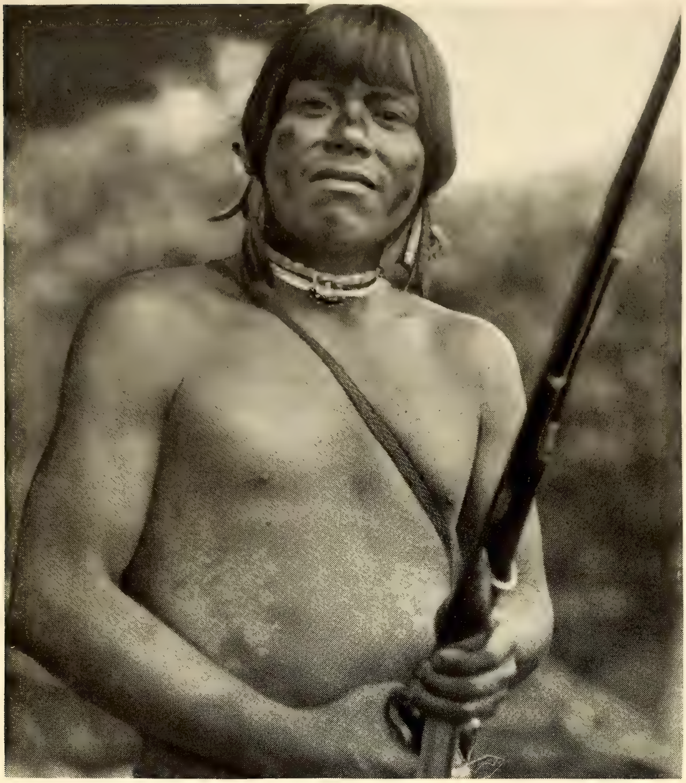
* The author, accompanied by Mr. George K. Cherrie, was the leader of an expedition sent to Ecuador, June, 1920, to March, 1921, by the American Museum of Natural History, of which he is the Associate Curator of Mammals of the Western Hemisphere.



HE MAY HAVE PAID A HUMAN HEAD FOR HIS WEAPON (SEE PAGE 331)

A few of the Jivaros have been able to procure muskets from traders. This burly Indian carried a muzzle-loading gun of cheap origin, the discharge of which must have been almost as much of a threat to the shooter as to the man at the muzzle end. The Jivaros were never weary of handling and admiring the author's guns, which represented to them the highest forms of wealth.

filled by men of this type. The great bulk of the population, however, is Indian, the Quichuas, who are themselves the descendants of the Incas.

The third element of the Ecuadorean population comprises the wild and savage Indian tribes of the *Oriente,* typified by the Jivaros or head-hunters. These latter Indians, while nominally under the government of Quito, are so far removed by the inaccessibility of their home territory that Ecuadorean laws rest lightly upon them, and they are in many respects as primitive today as when America was discovered.

It is to the purely American elements of the population that one looks for strange customs of interest to the northern visitor, and the Indians do not prove disappointing in this respect.

The Indians of the *Oriente* are much more savage and uncivilized than their brethren of the western Andes, the Quichuas. The Jivaros come into contact with the whites only occasionally, since the country they inhabit is very inhospitable in its climate, its dense, trackless jungles and, to a certain extent in its human population as well. They live in scattered communities, along the tributaries of the Rio Napo and the Rio Paute, seldom venturing very far up on the slopes of the eastern Andes, but remaining below an elevation of 3,500 feet.

WARRIORS ACQUIRE THEIR WIVES AS SPOILS OF WAR

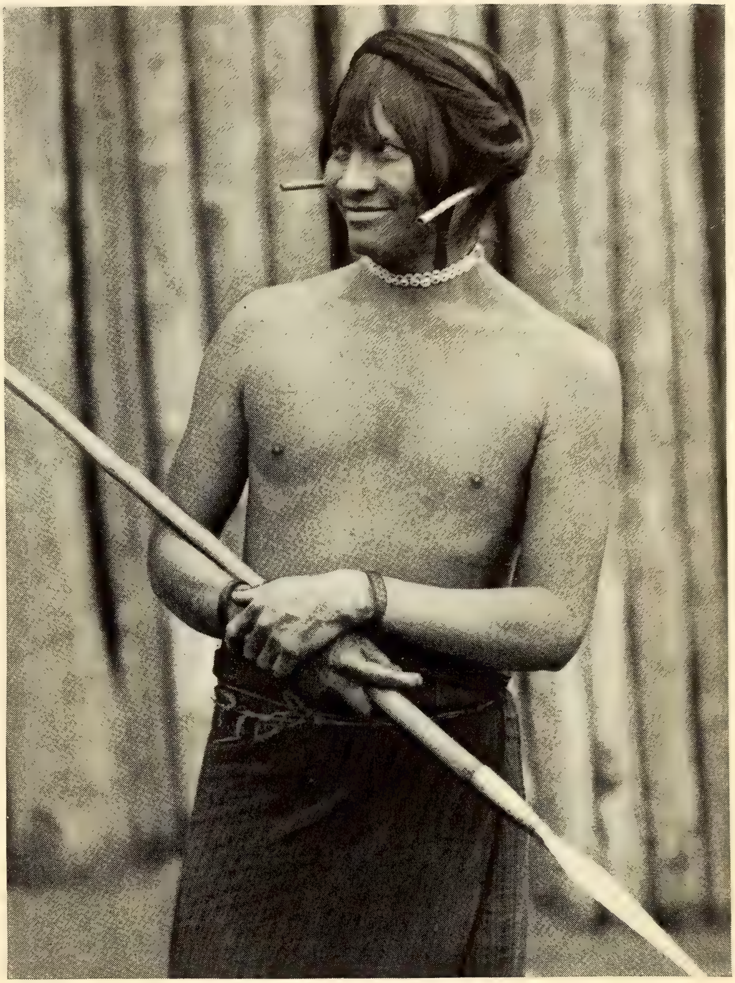
The Jivaros wage a constant warfare among themselves, for which polygamy is the direct cause. We were told that when a girl arrives at the marriageable age, about twelve to fourteen years, she is given in marriage by her father to some friend, but most of the wives are gained by the killing of an enemy and the confiscation of the women as the spoils of war. A man may have from five to eight wives.

The warfare may be against a member of a neighboring tribe or against a fellow-Jivaro living at some distance. The women and children of the slain man are adopted into the household of the victor, where they become members of the family and are treated in the same manner as the immediate family, not as slaves.

These Indians have a pseudo-religion which is based on a belief in a being called by the Spaniards *el diablo,* the devil. He has the attributes of a super-Jivaro, is all powerful in everything he under-takes, but is not particularly addicted to evil for its own sake.

No important project is undertaken without first consulting *el diablo* and getting his views. The Jivaros do not appear to have a highly developed priestly class and any man may enter into consultation with him. To do this, it is necessary to retire to the seclusion of some spot remote from the rest of the Jivaros, and here the would-be communicant prepares himself for the ordeal by drinking a quantity of a certain extract made from a particular variety of bark. This fluid is dark, about the color of coffee, and contains some very powerful narcotic principle, for it produces a stupor and hallucinations, of a different type but in a way comparable to the result produced by the use of opium or hemp.

While under the influence of this drink, which may be for four or five hours, the Jivaro imagines that the devil comes to him and discusses whatever matter is afoot. Inasmuch as the mind of the man is filled with his plans when he takes the narcotic, it is but natural that his disordered reason concocts a fanciful dialogue and arrives at a confirmation of what he really believed when he first came.



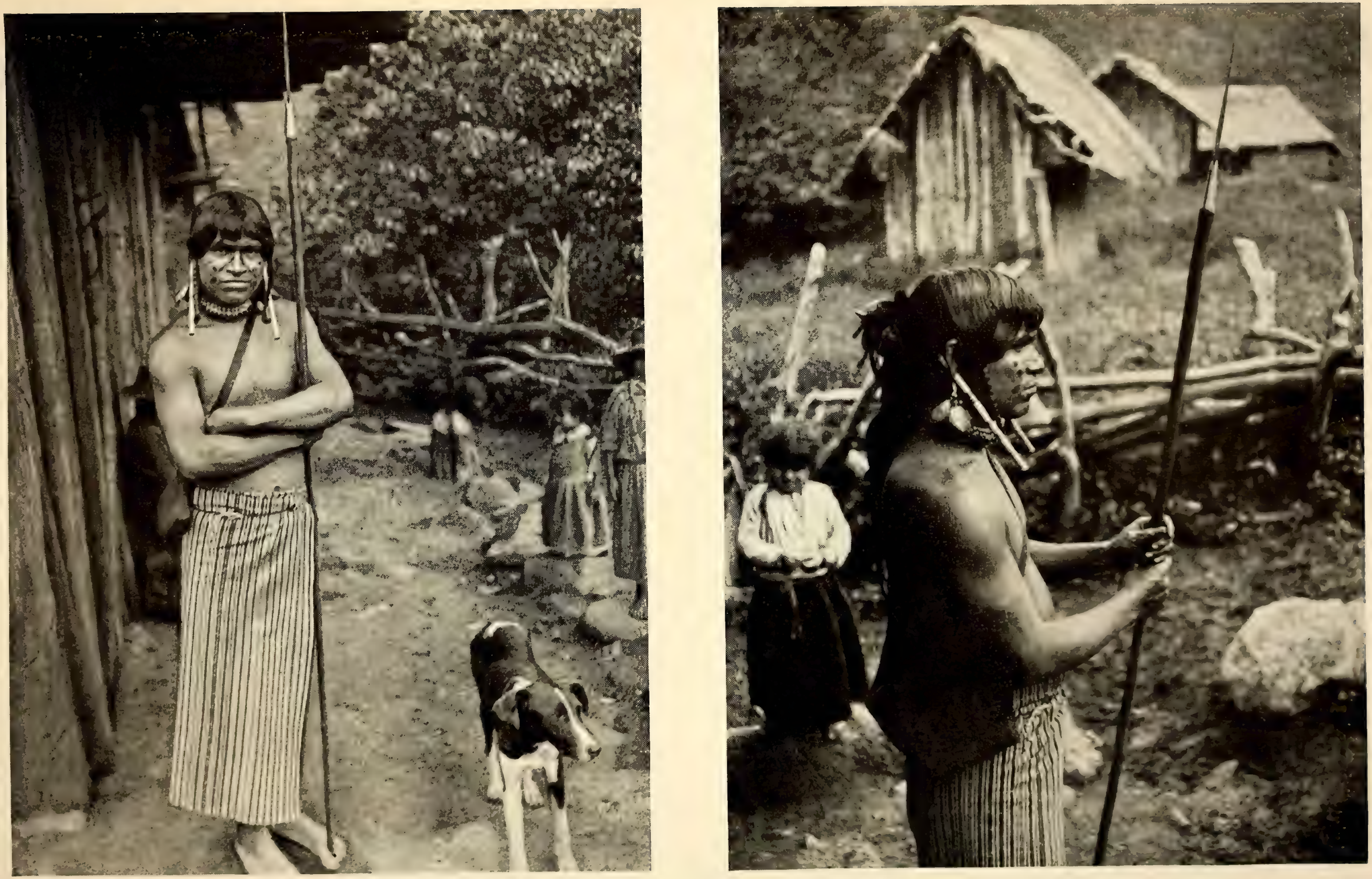
"T'SERIE" DOES NOT LOOK THE PART OF A HEAD-HUNTING SAVAGE

But this is a case where appearances are deceptive. He wore a perpetual smile while visiting the author and his party and seemed the soul of good nature. His necklace is made of white buttons and his hair shows that he gave it all the attention deserved for such a momentous occasion, his debut before the "Gringos." "T'serie" is also the name the Jivaros use for the small marmoset monkey.

If the devil has properly coached his client and the raid is eminently successful, the hut of the victim is surrounded, and when the latter steps out of the door he receives at close range the contents of all the guns in the party. The women and children are hastily captured and the raiders seek the safety of their own neighborhood, with the reasonable assurance that sooner or later they will be raided in a like manner by relatives of the slain man.

PREPARING A VICTIM'S HEAD AS A LASTING TROPHY

The head of the victim is cut off, and later, in the seclusion of his hut, the victor prepares it into a lasting war trophy, attaching to it the significance which the North American Indian attached to



ONE OF THE MOST PICTURESQUE OF THE JIVAROS

His face is spotted with paint; bright red, orange, and yellow toucan feathers are tied in his hair; his necklace is an intricate work of art, while his splendid physique would of itself attract attention. Note the base of the lance is grasped by the great toe.

The lance is used by the Ecuadorean Indians in hunting such animals as the spectacle bear, the peccary, and the tapir, which may be encountered in the jungle trails. It has an iron spearhead and is a formidable weapon.

scalps. The skin is opened up from the base of the neck to the crown, and the skull is removed entire, leaving only the soft, pliant skin.

The skin is now dipped into a vegetable extract which dyes it a blue-black and probably has some action as a preservative, and then the cut skin is sewed up along the neck to restore the head to its original form.

The cavity is filled with hot sand or pebbles, after which the head is constantly turned and moved, so that the drying goes on uniformly. When the sand has cooled, hot sand takes its place, and this process may last for several days before the head is completely cured.

Shrinking to an unbelievable degree takes place, but it is so regulated that the features retain their individuality to a great extent, and the finished head is about the size of a man's fist.

The lips have been sewed shut with a series of long cotton cords, the exact pattern of this stitching varying with the locality and seeming to have some significance.

Within a short time after the preparation of a head, generally within a month, the victor celebrates the event by a ceremonial dance at which there is an orgy of wild drinking. After this dance it may be possible to buy the head from the Jivaro, if his interest can be aroused in an object whose value he understands and appreciates, such as a musket.

SOUVENIR CRAZE STIMULATED HEAD-HUNTING

Because of the interest aroused in the outside world by tales concerning these head-hunters, there has been in the past a lively trade in human heads. The Jivaros, learning that there was this demand which could be capitalized into muskets, quickly gave a ready response; so that it became necessary for the Ecuadorean Government strictly to forbid the traffic in these objects.

Tales are told of the results of this practice which are not without a certain grim irony. There is a story, for example, of a red-headed white man who went into the interior on a trip of exploration charged with the commission of bringing out a dried and shrunken head. It was months after he had departed that a shrunken head came out, by devious channels, from the *Oriente,* but the head had red hair. Perhaps a red-haired head brought the price of two muskets; who can tell?

Contrary to our expectations, after hearing stories of the Jivaros (and to the average Ecuadorean the word Jivaro is synonymous with violent death and all manner of disagreeable things), we found them a good-natured people and very friendly to us.

Like the Quichuas, they are below medium height, but with a splendid chest development and with a rather pleasing cast of countenance. The men wear their hair long, but often cut it away to form bangs in front, and it is ornamented with tufts of bright red and yellow toucan feathers on the crown and at the base of the neck.

The men wear slender tubes of bamboo thrust through the lobes of the ears and the women often have a short piece of cane projecting straight out from the lower lip.

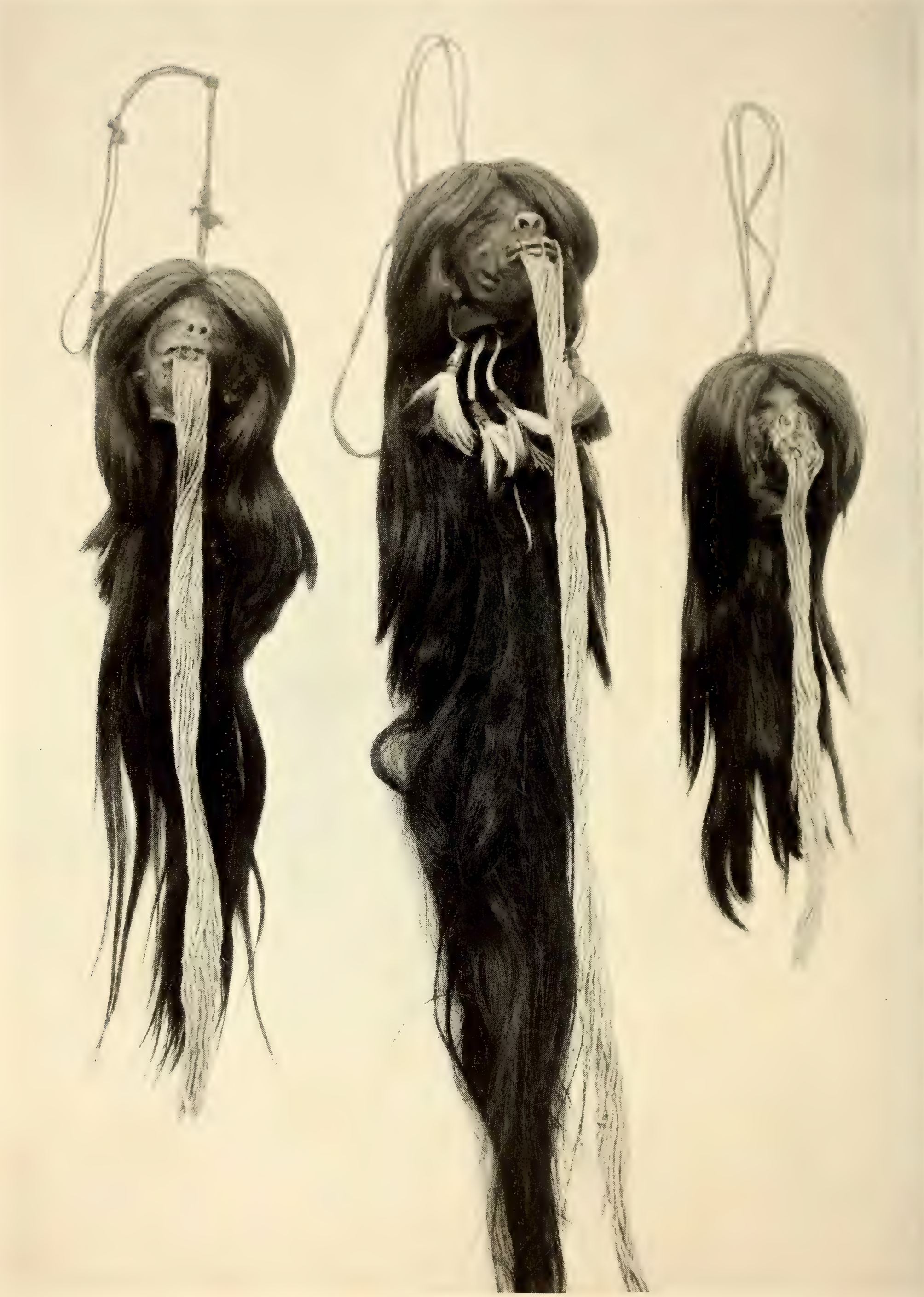
FAITHLESS WIVES RECEIVE DIRE PUNISHMENT

On their own trails, the Jivaro costume could scarcely be considered a burden to the wearer, but when these Indians visit the border settlements they wear a one-piece garment consisting of a cotton cloth, which they weave themselves, caught up around the waist.

The men we saw appeared to treat their women kindly and showed a consideration for their wishes in minor matters. If the wife is detected in any breach of infidelity, however, she is subjected to a terrific course of discipline.

For the first offense the punishment consists of throwing the erring woman to the ground, holding her there, and cutting down on to the crown of her head with a large machete, or brush knife. The man makes a great many cuts, which are at an angle to one another, so that the scalp is literally hacked into small pieces and all the hair is lost.

Should this not prove sufficient to inculcate fidelity, the second offense results in the woman's being pinned to the earth by a long, iron-pointed lance, which is thrust deep into the ground through the fleshy parts of both legs. Given food,



Photograph courtesy American Museum of Natural History

TROPHIES OF A MAN-HUNT IN INTERIOR ECUADOR

These are dyed and shrunken human heads, prepared after the Jivaro recipe, which might be compared to those that one sees in the old English cook books, the ones that begin, "First you catch your hare." The heads shrink to the size of a man's fist and are dyed a blue black. The hair is natural, for the Jivaro warrior wears his locks long (see text, page 331).

water, and sufficient care to prevent death, the offender is left in this position for days, even for a period as long as three weeks.

For the third offense the punishment is death outright.

BLOW-GUNS AND POISONED ARROWS ARE THE NATIVE WEAPONS

As hunters and woodsmen the Jivaros are unsurpassed. Observers of the keenest sort, endowed with that natural instinct of the savage for knowing direction, they hunt and roam over the vast unbroken stretches of jungle, following the paths made by wild animals or slipping through the more open regions regardless of trails, calling the monkeys down the green hillsides by wonderful imitations of their calls, and sleeping at night, like the beasts themselves, where darkness overtakes them.

They hunt largely with the blow-gun, in the use of which they are peculiarly adept. The missiles for these weapons, which are sometimes twelve feet or more in length, are sun-baked balls of clay for the smaller game and poisoned arrows of cane for larger animals.

The poison is apparently a form of curare and is obtained from traders farther down on Amazonian waters. It is very potent, death resulting in a few minutes after an animal has been struck; but the use of it does not spoil the game for consumption.

Salt is said to be an antidote, if placed in the mouth of the stricken animal, and monkeys are sometimes taken alive in this manner, the Jivaro hurrying up to administer the panacea when the quarry falls from the limb in a stupor.

"BARBASCO" USED AS POISON FOR FISH

Another poison which is extensively employed by the Jivaros is *barbasco,* a jungle vine or creeper, which is put into the rivers to secure fish. A great pile of the plant is beaten up on the rocks until it is a pulp, and after the Indians have stationed themselves down-stream some of their number throw two to three hundred pounds of the mash into the river and the fishing begins. The fish are killed and float down, belly up, to be gathered in by the Jivaros, who see them as they pass.

So potent is this juice that large streams may be poisoned by this relatively small amount of *barbasco,* and under favorable circumstances fish are stricken for a distance of three miles down-stream.

Needless to say, the Jivaros speak a language of their own, very distinct from the Quichua tongue, and only a few individuals speak Spanish.

The principal cities of Ecuador are the capital, Quito, and the seaport, Guayaquil. The latter is the first port of call for many ships sailing south of Panama, and to reach it the vessel must enter the Gulf of Guayas, and then steam up the wide tidal river of the Guayas.

Guayaquil is a large city, of about 90,000 population, and for many years had the unsavory reputation of being the worst pesthole on the Pacific coast. This was due to the virulent yellow fever which was prevalent there and to the sporadic outbursts of the bubonic plague, which kept the city under a perpetual quarantine; and travelers shunned it whenever possible.

A YANKEE-BUILT RAILROAD FROM GUAYAQUIL TO LOFTY QUITO

The Rockefeller Foundation took in hand the cleaning up of this city, with the result that now yellow fever has practically disappeared and the bubonic plague is kept well in hand. The quarantine against the port has been lifted, Guayaquil is once more a stop on the maritime itineraries, and the Ecuadorean has a reverence and a faith in the "gringo medico" almost as strongly fixed as is his religion.

Coincident with this improvement in the hygiene of the city, new streets have been built and new buildings erected, so that Guayaquil is rapidly forging ahead.

Ecuador has in operation a railroad with a terminus at Guayaquil and at Quito, with plans and some of the work completed for extensions to other points. The track climbs up from sea-level to an elevation of nearly 11,500 feet, and over much of its journey to Quito it negotiates very heavy grades and sharp curves. As a piece of mountain railroading it is worthy of much comment, and it is Yankee-built.

The trains of the Guayaquil and Quito Railway need two days for the climb up to the capital, and at the end of the first

HEAD-HUNTERS HAVE MARKED HIM FOR THEIR OWN

This is Martín, one of the most influential of the Jivaros. He was rather better versed in Spanish than any of his fellows, and appeared to be quite intelligent. After the American party left Zamora the author learned that there was afoot a plot to kill this native, which was causing grave concern among his friends. A raiding party was expected from an adjacent river. The author left while the issue was still in doubt.

day all the passengers alight at Riobamba and stop overnight at the hotels there.

Riobamba is a medium-sized town, with several hotels and a fair number of shops. It lies in a very rich and fertile valley, and because of its strategic position with regard to the railroad, being a junction point, it is rather an important place.

UNUSUAL MARKET METHODS IN ECUADOR

The most interesting feature of the city is its public market, in an open square. Scattered over the ground are groups of Quichuas and a few Spaniards, with a great variety of things for sale.

In one corner of the market are the butchers, with beef or pork on display, the beef haggled and chopped up with a complete disregard of joint or bone, the pork not infrequently sold as a whole roast pig. Next to them may be the millers—women seated on the ground with a row of opened sacks before them, in which may be seen flour made of wheat, barley, corn, or peas, the dealer measuring out the flour in a tiny cup or perhaps weighing it with a crude balance.

The common trade balance of Ecuador is a short stick carrying a suspended pan at each end and held up by a cord about the center. The weight is a rock about the size of a man's fist, and, while no two of them are ever the same size, the merchant is always prepared to pledge his honor that the stone weighs a full and exact pound.

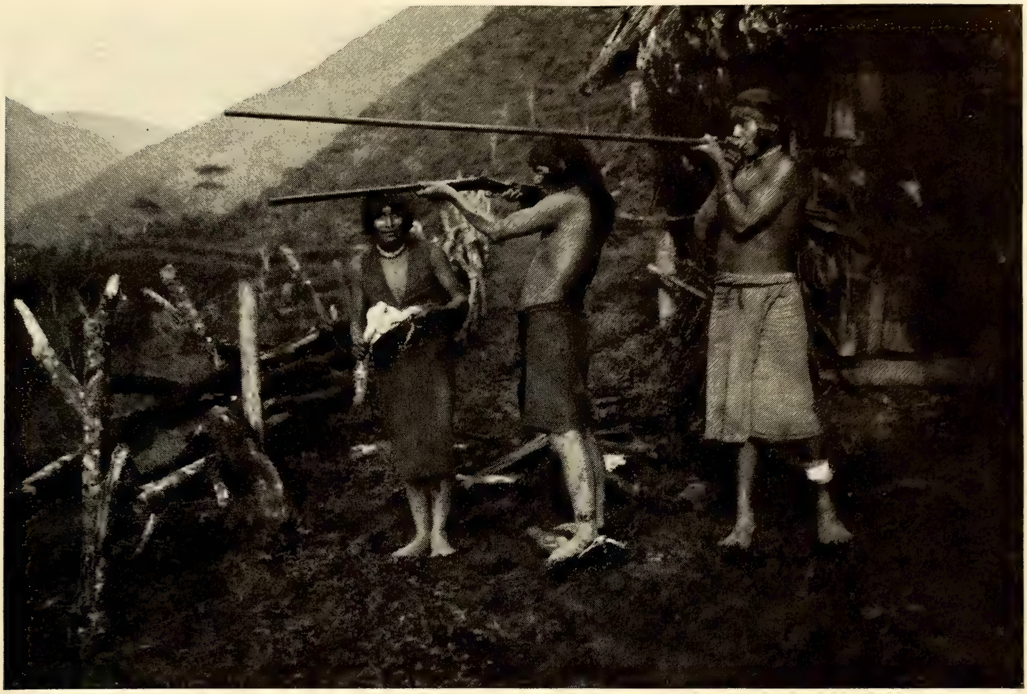
The price for a commodity is almost never fixed, and as the Ecuadorean is always prepared and expects to come down somewhat from his first price, it speaks worlds for his optimism that he invariably tries to get more. The bargaining does not actually begin until you have disregarded the first figure and asked, "What is the last price?" ("el ultimo precio?") In fact, I have been told voluntarily, when pricing ponchos, that the price was twenty-five sucres, but "I can come down a little."

QUITO, ON THE EQUATOR, HAS AN INVIGORATING CLIMATE

Quito is almost as large as Guayaquil, but because of its invigorating climate it has a far more healthy environment, and the city itself seems to disclose more vigor among its citizens.

It is situated on a plain, at the foot of Mount Pichincha, and, when the air is sufficiently free from clouds, I am told that it is possible to see eleven snow-clad peaks from the city. Because of the elevation of Quito, some 9,375 feet above sea-level, some of these peaks do not appear to tower very high; nevertheless they are a beautiful sight, seen across the rolling green hills of the Páramo.

The streets are paved with stone, for the most part, and are rather better kept than those of the average Spanish American city. Quichuas throng the city, do-



WEAPONS OF CIVILIZATION AND SAVAGERY: RIFLE AND BLOW-GUN

These Jivaros accompanied the author's party from Zamora to Loja, a three-days' journey. The Indian with a bandaged leg had recently become a successful head-hunter and refused to eat any meat, in accordance with tribal custom. The others were restricted by no such deterrent, and the photograph shows a bird ready to be cooked.

ing all the burden-bearing. Dressed in their picturesque ponchos, they give to the city the aspect of a frontier town, an aspect rather belied by the flourishing business of the cinema, where we saw our own Pearl White thrill the emotional Ecuadorean to the point of wild enthusiasm.

Quito is by far the most attractive city in all Ecuador, and the traveler is loathe to leave it, if his stay has been a short one.

LOJA, METROPOLIS OF SOUTHERN ECUADOR

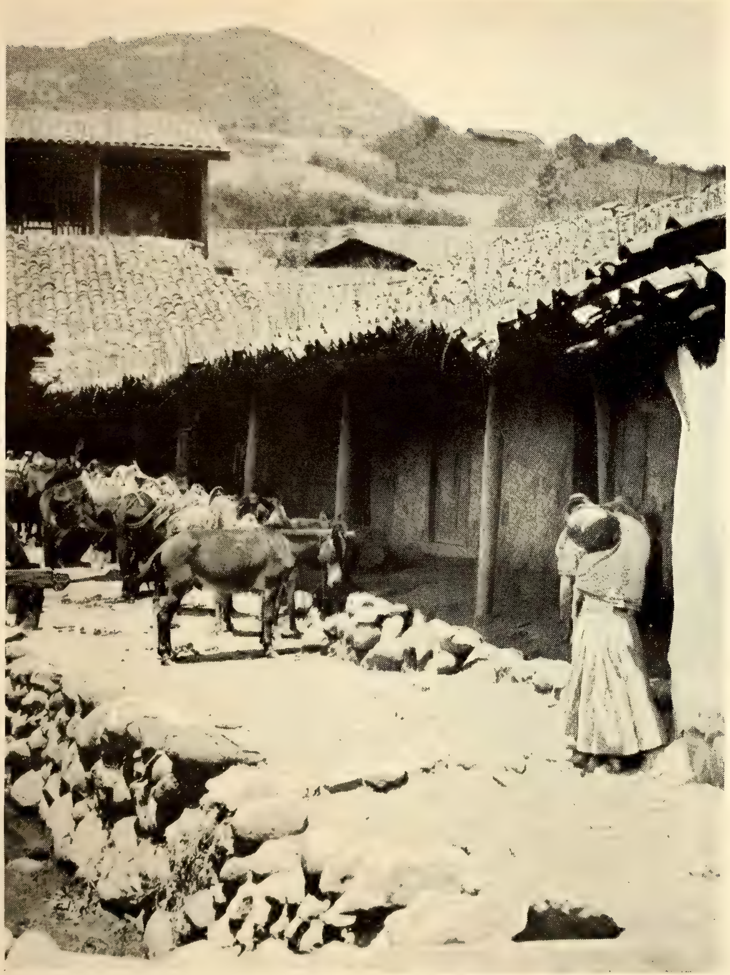
Because of their inaccessibility, the interior towns are apt to be more picturesque, more untrammeled by civilization in its final manifestations. Such a city is Loja, the modest metropolis of southern Ecuador, with a population of perhaps ten or twelve thousand souls.

The educated class of the Lojanians, the Spaniards, are very punctilious in the observance of dress, and it is a common sight to see a citizen clad in very proper Prince Albert, with a tall hat, cane, and resplendent shoes, picking his way over the uneven cobbles, rubbing elbows with a scarlet-ponchoed Quichua or crowding by a group of Cañari Indians, with their hard woolen hats, which look like dirty, disreputable derbies.

Two small streams flow through the city, the Rio Malacotas and the Rio Zamora, destined to become part of the Amazon, and it is well worth a walk to one of the bridges over these rivers to watch the townspeople bathing and washing their clothes. Every one enters the water with his clothes on, and by dint of a great deal of splashing evidently is able to overcome the handicap of this covering.

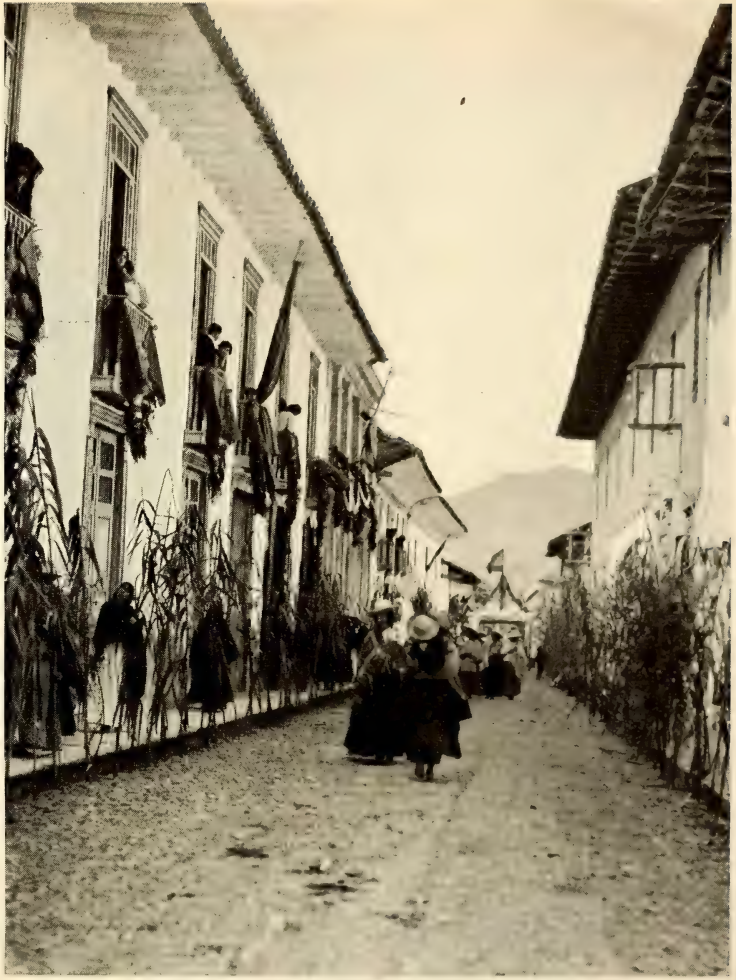
Probably the most important of all these interior cities of the interandean region is Cuenca, to which a railroad is being constructed.

There are numerous small towns of only a few hundred population, where the arrival of a traveler from the outside world is a great event. The passage of such a



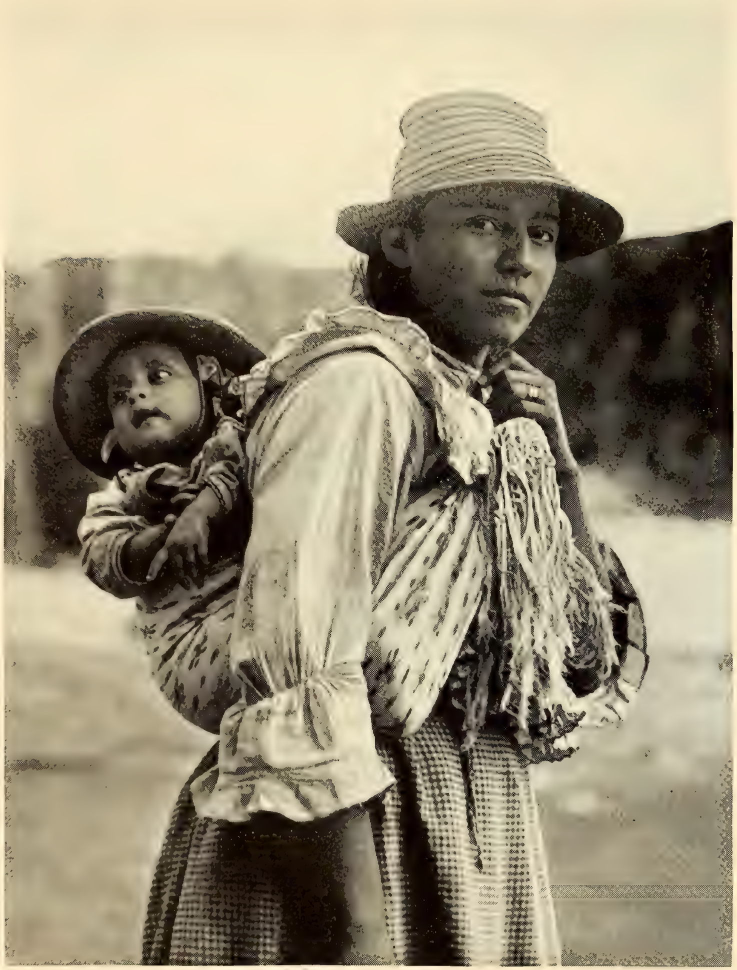
A RESTING PLACE ON AN ECUADOREAN TRAIL

Under the eaves of the red-tiled roofs, the *arrieros* (muleteers) have tied a mule train, where the patient animals may stand all day. A woman with a jar is entering one of the houses, having been to the public water supply, an open stream which flows through the center of the little town.



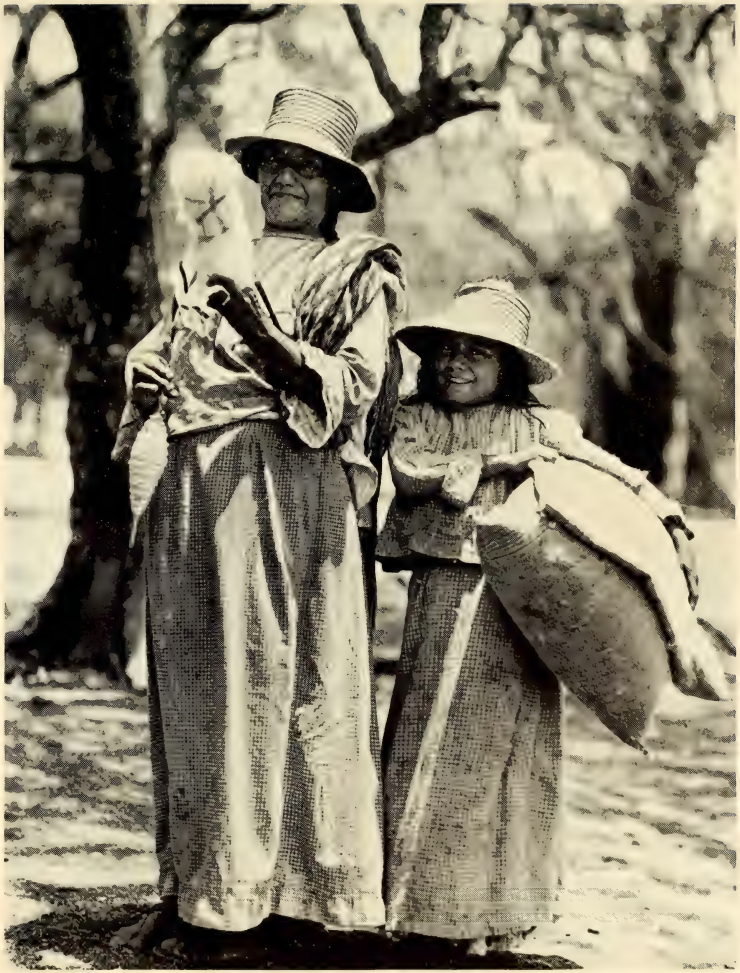
WELCOMING A NEW BISHOP TO LOJA

The Ecuadoreans make much over all religious celebrations, and when a new bishop of Loja was appointed the whole city turned out to do him honor. Not only were the streets decorated, but as he came to Loja from Cuenca, about a week distant on Andean trails, he found decorations along the way, miles from any town.



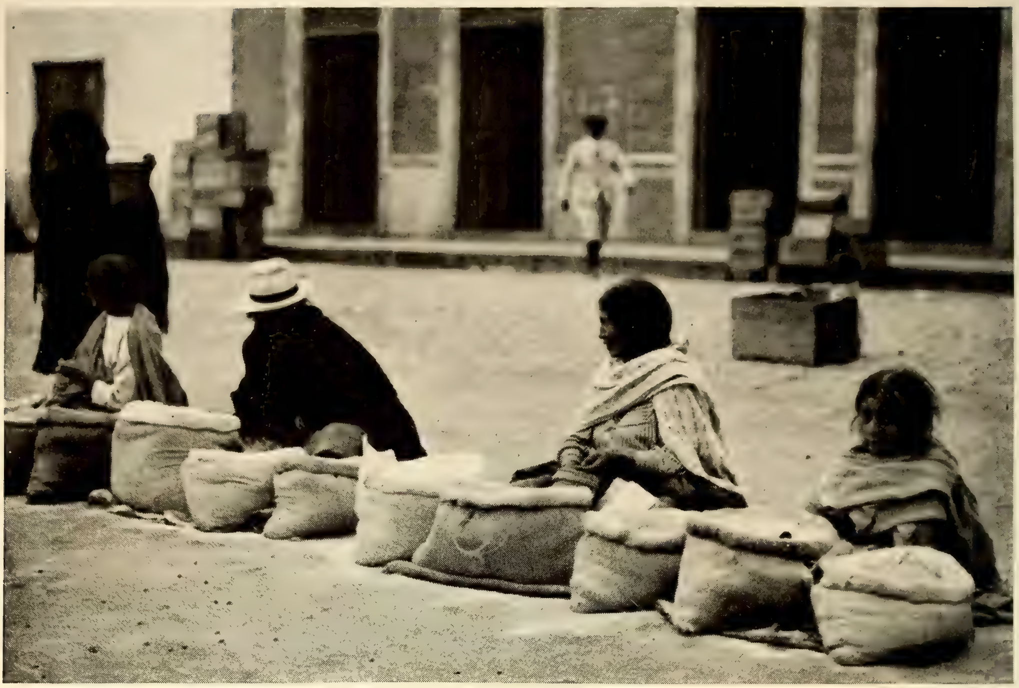
CHILDREN ARE CARRIED IN A SHAWL OR CLOTH SLUNG OVER THE SHOULDER OR NECK OF THE MOTHER

So secured, the child is held comfortably and safely and the hands of the mother are left free. Ecuadorean children are solemn little things and do not play as northern children do.



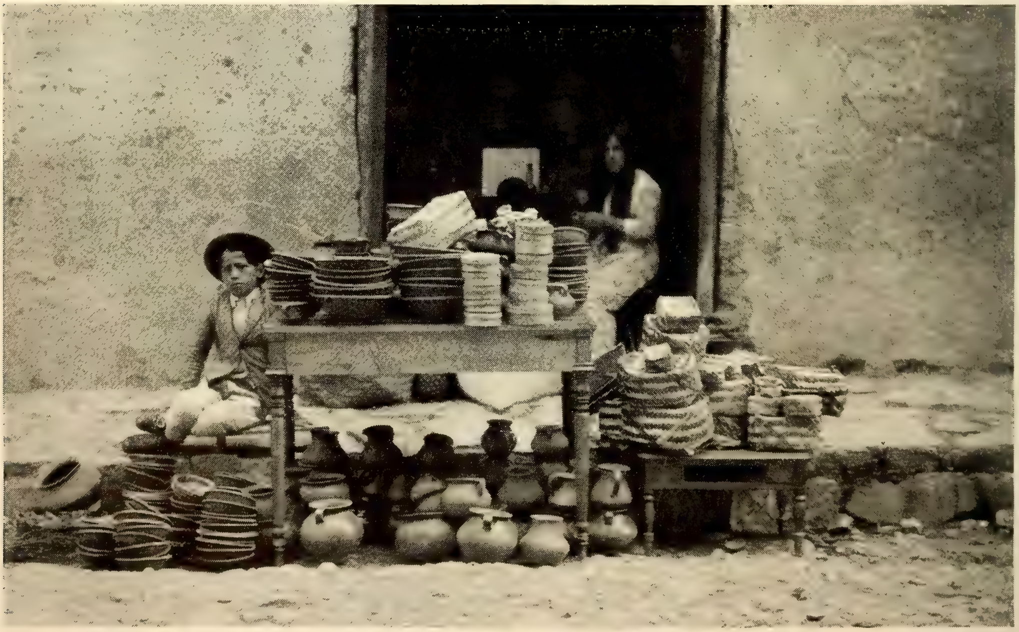
SPINNING IS A HABIT WITH THE NATIVE WOMEN AND ONE THAT IS ACQUIRED AT AN EARLY AGE

In the lowlands, where cotton is grown and the heat of the region demands lighter clothes, all of the spinning is done with this staple, which is drawn out into very fine threads.



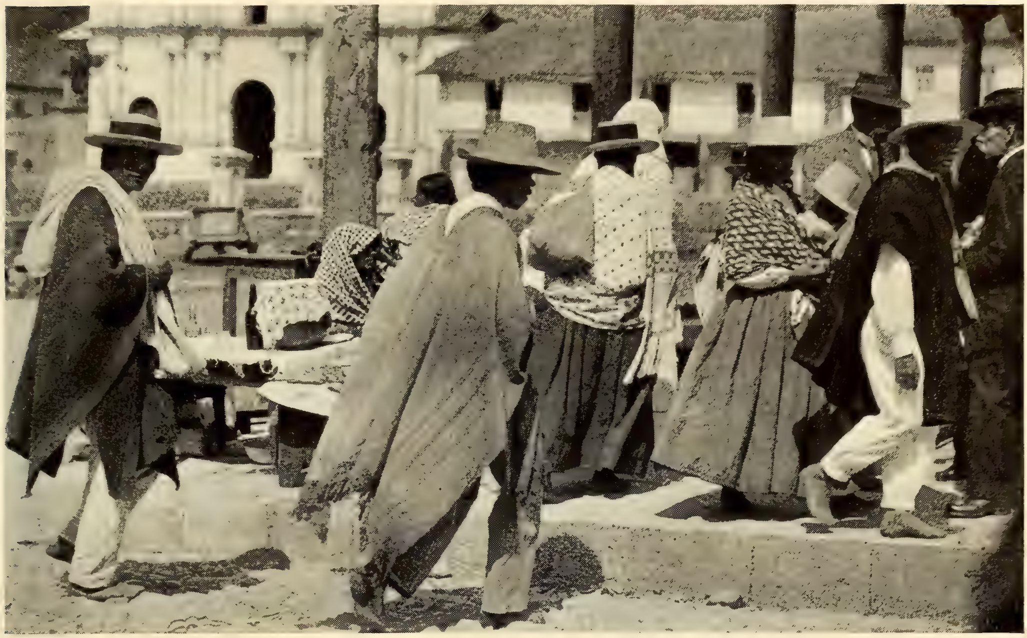
MILLER'S ROW IN THE MARKET-PLACE OF RIOBAMBA

In the public markets the different commodities will often be found segregated in districts. In Riobamba, the center of a cereal region, the display of flours was rather noteworthy. Flour is made of wheat, barley, corn, and peas in Ecuador.



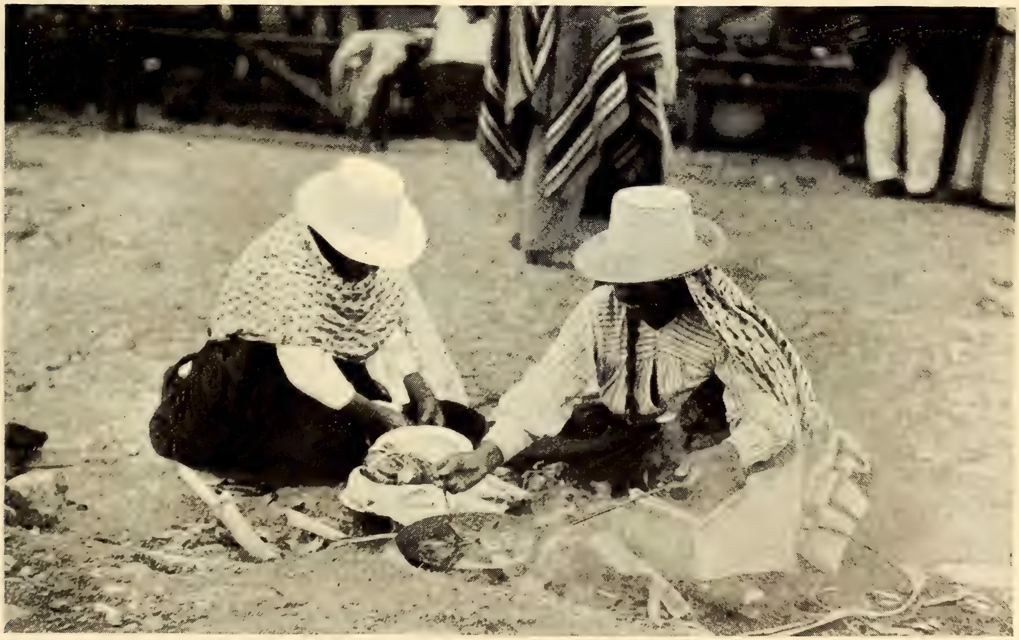
AN ECUADOREAN POTTERY EMPORIUM

Much of the ware for sale is displayed out on the street. At this booth the owner is featuring the heavy red pottery and the cheap basket-work of the region. Clay suitable for pottery and tiling is found everywhere in Ecuador and put to a serviceable use.



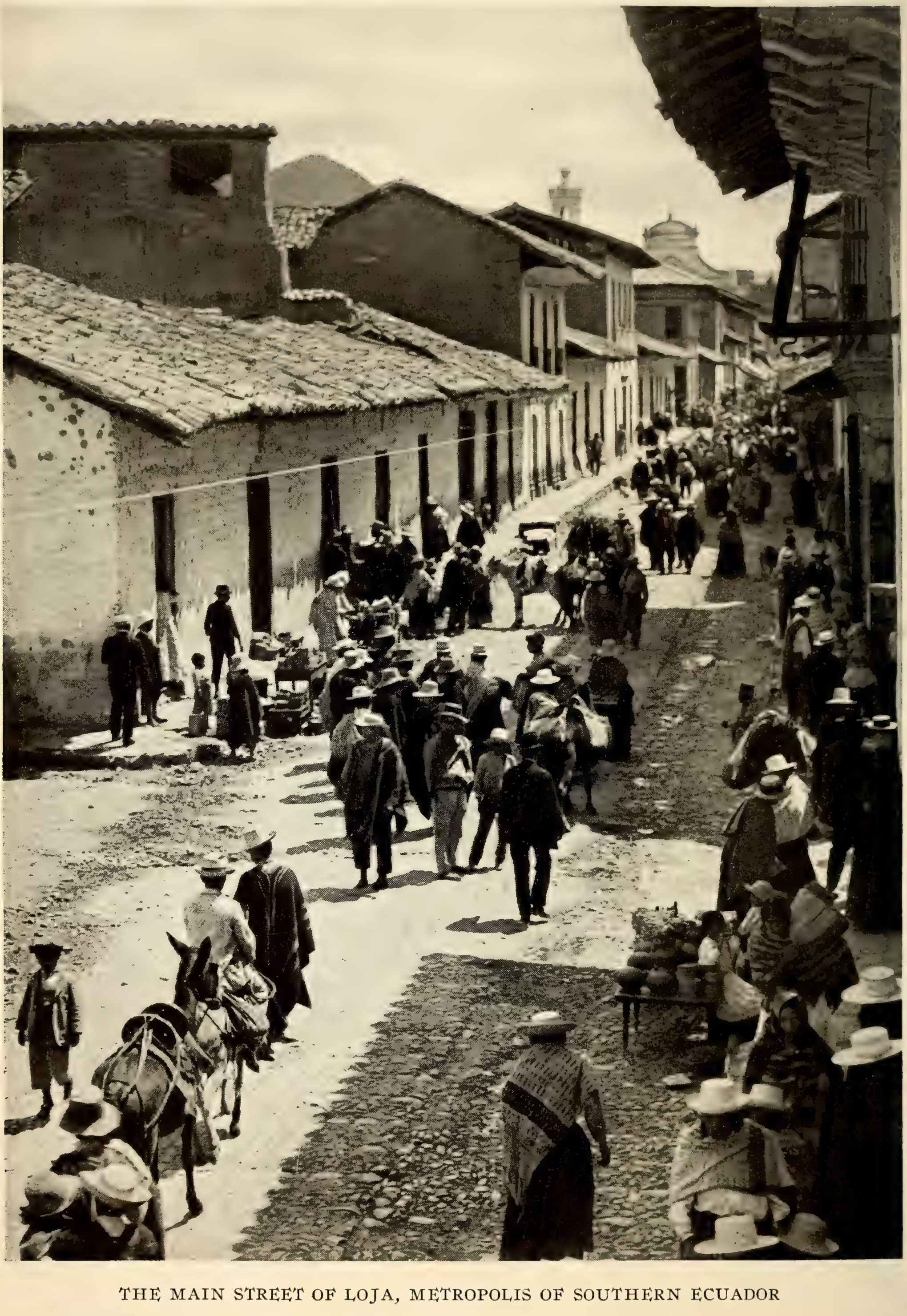
IF HE STANDS ON THIS CORNER, SOONER OR LATER THE VISITOR SEES ALL THERE IS OF INTEREST IN LOJA

It faces the *plaza principal,* where certain favored ones maintain small booths and sell things to eat, drink, or wear. Just up the street is the rendezvous of the city, the cinema, an open-air enterprise held in the interior courtyard of one of the houses, where the films are run at half speed to make them last longer.



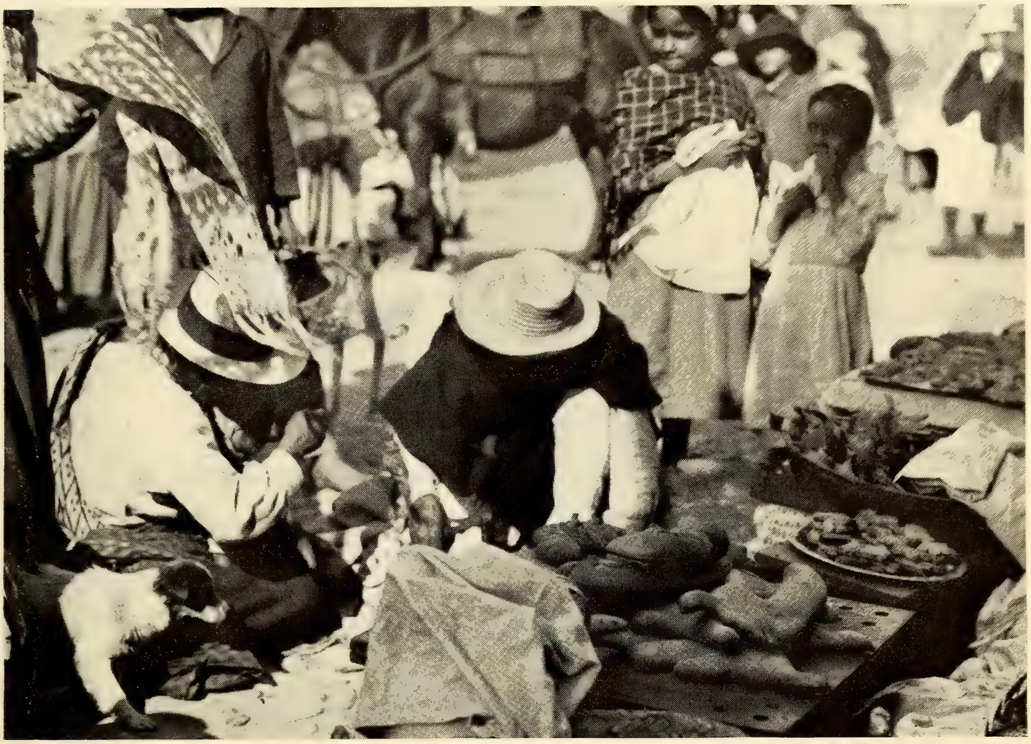
PREPARING A HOLIDAY MEAL IN LOJA

During the time of the fiestas, when the small towns are crowded to the utmost, many of the natives do their cooking out on the open plaza or in the market-place. Often small "restaurants" are conducted in a similar fashion, the patrons squatting about on their heels to be served from two or three large utensils kept over a small fire.



THE MAIN STREET OF LOJA, METROPOLIS OF SOUTHERN ECUADOR

It is fiesta time, and all day and most of the night people throng the principal thoroughfare, passing with mule-loads of merchandise, collecting about the stores and street booths, or gathered in convivial groups about the liquor stores. Every one is dressed in his best, from the merchant in his sedate black suit to the Quichua in his brilliant poncho. The street is alive with color, from the sky-line, where the brick-red tiles stand out from the fluffy white clouds, to the ground itself, where the itinerant peddlers have spread bright ponchos and heaped thereon little piles of cheap trinkets.



SELLING BREAD BAKED IN THE SHAPE OF ANIMALS FOR ALL SAINTS' DAY IN LOJA

Dough is worked up into the shapes of people and animals of the fields to sell for this feast day. While many of these figures require a dutiful imagination and a word or two of explanation to determine the identity of the representation, they appear to be high in popular favor. One might imagine that the dog in the picture had espied a canine friend in dough, but it would, perhaps, be nearer the truth to state that he is doubtless contemplating a bite out of the plump outlines.

one calls forth all the able-bodied inhabitants and furnishes the main topic of conversation for several days, provided the traveler has the customary type of muleteer, a talkative one, who will tell all about his patron's errand in the region.

The people of Ecuador are very religious and most of them are of the Catholic faith. Every little village has at least one church, and the larger towns have many; so that, even from a distance, the most conspicuous edifices are the churches, for their spires and belfries overtop all other buildings.

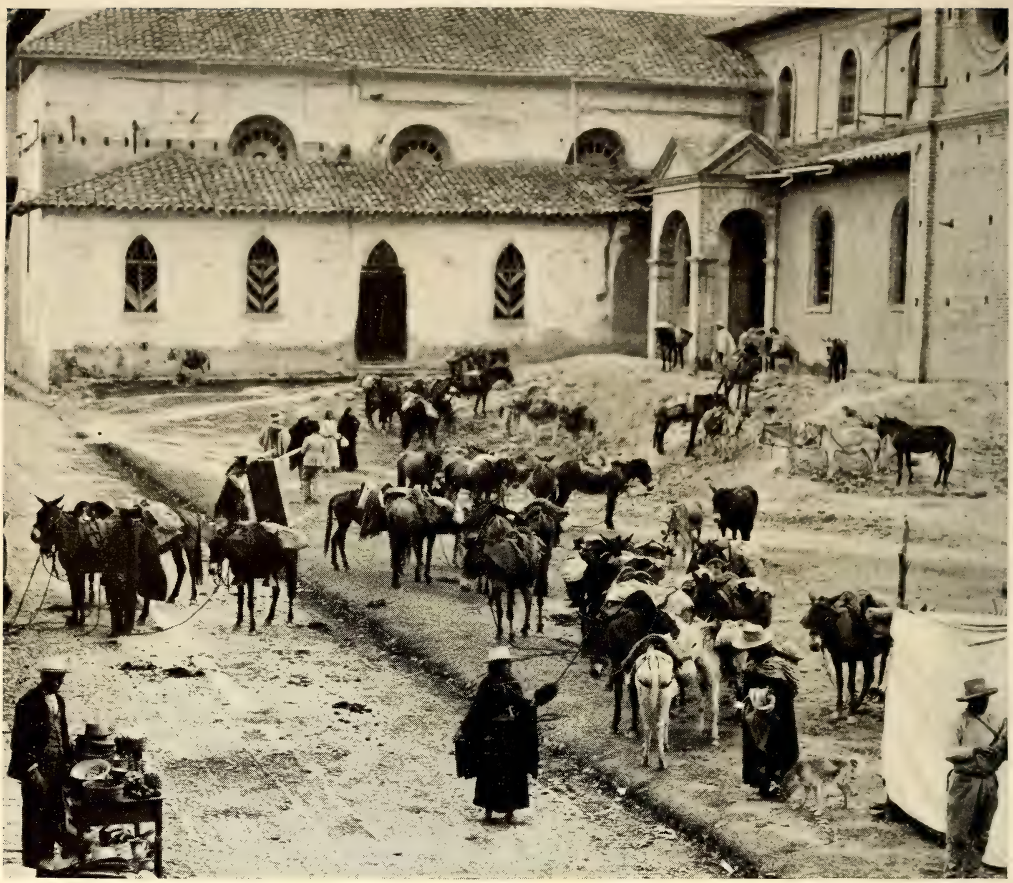
MERCHANTS TAKE ADVANTAGE OF IMPORTANT FIESTAS

There are numerous fiestas to be observed, because, in addition to the celebrations ordained by the church at large, there are many local saints and virgins for whom the devout natives are always willing to declare a holiday.

There are several important fiestas held annually in the interior cities, and merchants send wares from a long distance to take advantage of the crowds which flock into town on these occasions. These throngs which gather around the stalls and booths, clad in their gala attire, present a picture radically different from any to be seen north of Spanish America. Everywhere the eye may rove, it will be arrested by quaint costumes or bright patches of gaudy color.

The men are resplendent in brilliant new ponchos, the women in shawls, generally blue or green, while, ever shifting and mingling in kaleidoscopic effects, will be seen flaring yellows, deep purples, flaming reds, and startling greens.

This pattern is broken up at frequent intervals, and the crowds scatter when, with a great clattering of hoofs, the gallants of the town come riding along the cobble-paved streets, spurring their horses



A LOJA CHURCHYARD OFFERS HOSPITALITY TO MULE TRAINS

or mules at a fast gait, and reining strongly to force the beasts to arch the neck and curvet, with the result that they go slithering and plunging, to the great detriment of the bystander who does not give way or who stands too close to a puddle.

During the fiesta of All Saints' Day the people drink quantities of an unfermented rice wine and purchase bread baked in a great variety of shapes to represent men, birds, horses, and other animals.

THE QUICHUAS ARE A STURDY PEOPLE

The majority of the people one sees in Ecuador are Quichuas, a sturdy people rather short in stature, but well built and stocky. In color they closely approximate our North American Indians, but their features are less stern and warlike. They do most of the labor of the republic and serve as porters, drovers, farmers, etc. The women labor as hard as do the men and take their places alongside them in the fields.

The costume of the Quichua is quite characteristic and picturesque. The principal garment of the man is the poncho, which he wears over the shoulders and allows to hang down to his knees, over a shirt and trousers made of coarse homespun.

The woman wears a cape-like garment in place of the poncho, and a voluminous skirt gathered in to form a bulky zone about the waist.

A FARMER MUST BE AN ACROBAT TO CULTIVATE HIS STEEP FIELDS

Both men and women go barefoot habitually, but have sandals made of rawhide to wear over the rocky places.

These people are exceedingly industri-

THE MILK-DELIVERY SERVICE OF LOJA

That there may be no question as to the freshness of the milk, it is drawn to order. The calf is taken along to act as a starter, but has its nose thrust aside when once the cow has been beguiled into letting down milk.

ous and persevering, but still hold to primitive methods that are wasteful in the extreme.

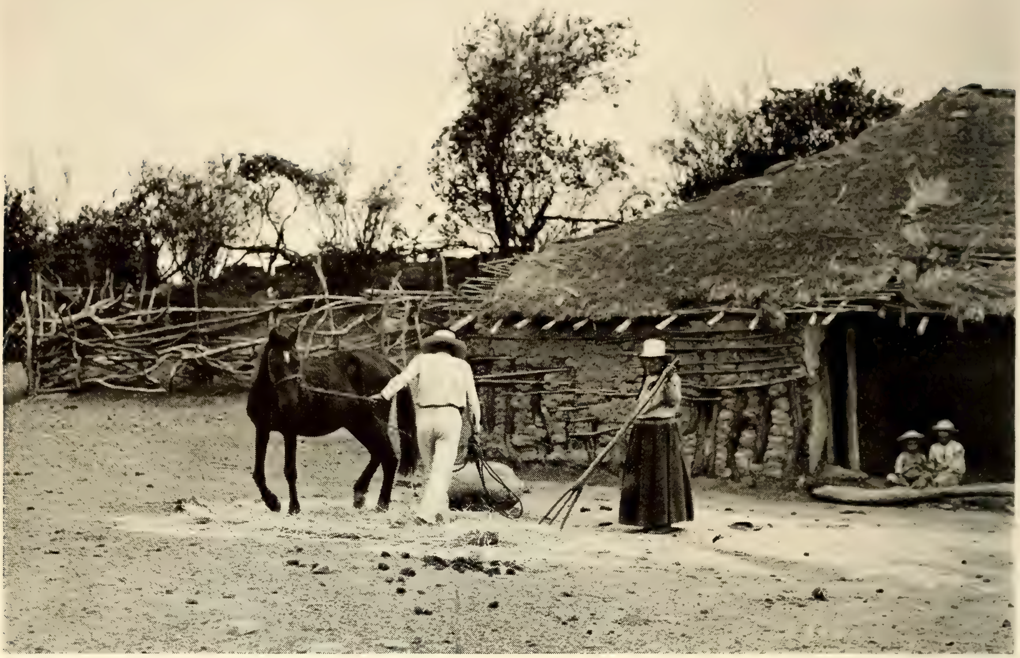
While the soil of Ecuador is very fertile in many places and both plant and animal life thrive, the topography is often such as to make the securing of a livelihood a constant struggle on the part of the Quichua, and many cultivated fields are seen on hillsides so steep that a man must be an acrobat to work in them.

Nowhere have the primitive methods persisted more steadfastly than in agriculture. Much of the plowing is still done today with wooden plows, which are merely sticks lashed together, a long one to serve as a pole and a short one fastened at an angle to scratch up the ground. Such shallow plowing fails to develop the resources of the soil, and the yields are low. Planting methods are equally laborious and unsatisfactory.

Because of the numbers of mules, horses, cattle, and goats that roam at will near the settled areas, the farmer must see to it that his fields are adequately fenced. In some places substantial fences are built of stones piled one upon another, and when these are not at hand, a substitute may be found in blocks of adobe; but the greater number of fences are formed of rows of the century-plant, or *cabuya*. The robust growth of the century-plant, the vigorous green of the leaves, and the striking appearance of the tall flower stalk combine to make these fences a pleasant feature in a landscape which otherwise would often be dull and uninteresting.

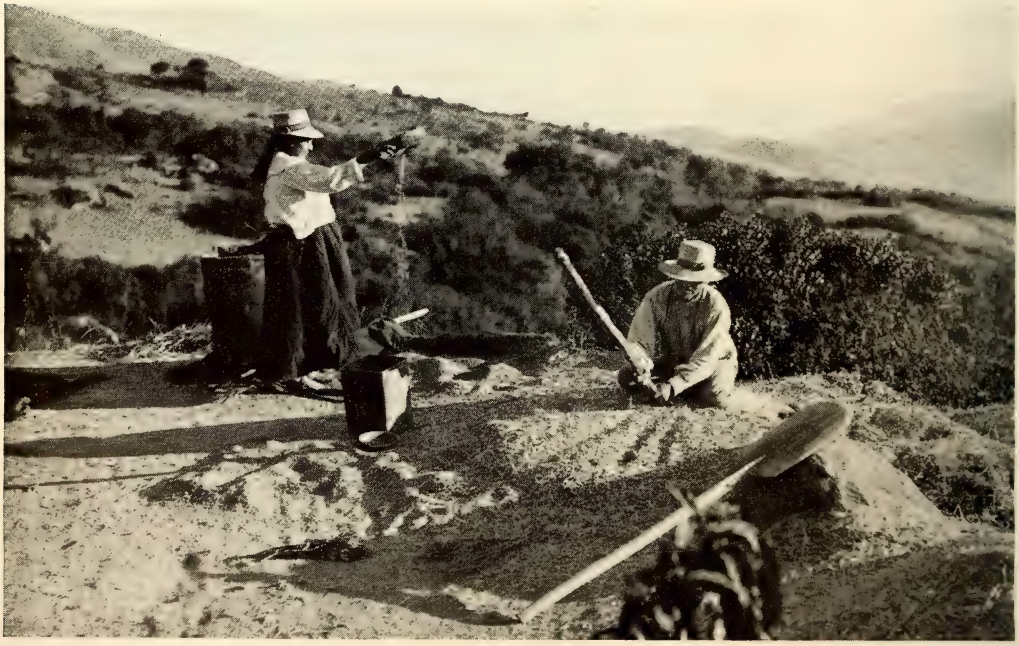
THE FARMER'S WIFE AND CHILDREN TRAMPLE OUT THE GRAIN

When cereals are ripe, they are cut by hand and brought in to the threshing-floor, which is a level, carefully cleaned spot. If it be wheat that is being har-



THRESHING A HANDFUL OF WHEAT

It is obvious that the farmer attaches value even to such a meager quantity. It will represent the labor of himself and his wife for half a day.



WINNOWING THE GRAIN

While her husband flails the straw for the last few grains, the wife goes over the chaff, a bowlful at a time, to separate the wheat. It may be noted that the chaff is blown by the wind out of the line of falling wheat. This woman feared to pose before the camera, but eventually consented, to please the "Gringos" who wanted the picture to show to their people.

CROSSING A CRUDE NATIVE BRIDGE WHICH SPANS THE UDUSHAPA RIVER

The interandean region is cut up by many streams. Often they have cut great gorges or ravines with steep slopes and eroded configurations. The gorge of the Udushapa is a wild region, a deep gash into the high plateau, where heavy rains bring down a turbid torrent.

vested, the stalks are piled up to a depth of a foot or two and domestic animals are driven around and around over them.

Any animal may be used, and, if the farmer is poor and has but a small harvest, his wife and children may trample out the grain. The ripened grain is easily shaken and broken out of the husk and gradually sifts down through the coarser chaff.

The winnowing is done with the aid of the wind. Bowls of the mixed grain and chaff are poured out from the height of a man's head, and the wind whisks the light chaff to one side.

Mills for grinding grain are available in the more thickly settled districts, but in many places wheat, barley, corn, peas, etc., are ground up into flour and meal upon flat stones by hand. Practically every step of harvesting, of whatever crop, is done by hand in the rural districts, and even such a task as picking over minute grains of rice does not seem to daunt these people.

Almost all of the sugar used by the natives of Ecuador is of their own manufacture. The sugar-mill consists of a series, two or three, of wood or brass rollers, operated by a long sweep, to which is hitched a yoke of oxen or mules. A child drives the oxen around their endless course and keeps them from stopping completely, although their pace is snail-like at best; nor is it accelerated by the fact that the small driver is generally engrossed in personal sugar-milling on a small scale, with a long section of the juicy cane clutched in one fist.

The juice from the rollers drops down into a trough which carries it into a receptacle at one end of the shed, and thence it is conveyed to a huge copper kettle to be boiled down and eventually form small brown cakes of crude sugar.

THE QUICHUA WOMAN IS ALWAYS SPINNING

The Ecuadoreans keep many sheep and goats and most of the Quichua clothing is made from the wool the Indians themselves raise. In the higher Andean valleys this wool is long and of a fine texture, and a rather unusual feature is the

A NATIVE WOMAN AT HER LOOM OUTSIDE HER HUT IN THE CASANGA VALLEY

In this hot desert region the little thatched huts are perched upon the summits of the low, rounded hills which dot the floor of the valley. On these eminences they are above the mosquitoes and flies. The platform over the loom is built as a support to keep corn above the ground, out of the way of rats and mice.

number of the black sheep seen in the flocks.

Every step in the manufacture of cloth from wool is taken by the Indians in the time-honored hand processes. The Quichua woman is an inveterate spinner, and everywhere she goes, if her hands are not otherwise occupied, she is engaged in spinning. Her distaff is a rough stick and her spindle a fine splinter of cane, with a potato or similar object stuck on the end to give weight and momentum to the twirling axis.

THE WORLD'S FINEST PANAMA HATS ARE MADE IN ECUADOR

The yarn is put on to a hand loom and woven into a close, tight fabric of very creditable appearance.

The ponchos loomed by the Quichuas are beautifully made, warm garments and their coloring is often harmonious and tasteful. There is considerable difference in the texture of the material made in the different sections of Ecuador, the finest, smoothest ponchos being those from the high Andes about Quito, where the best wool is raised.

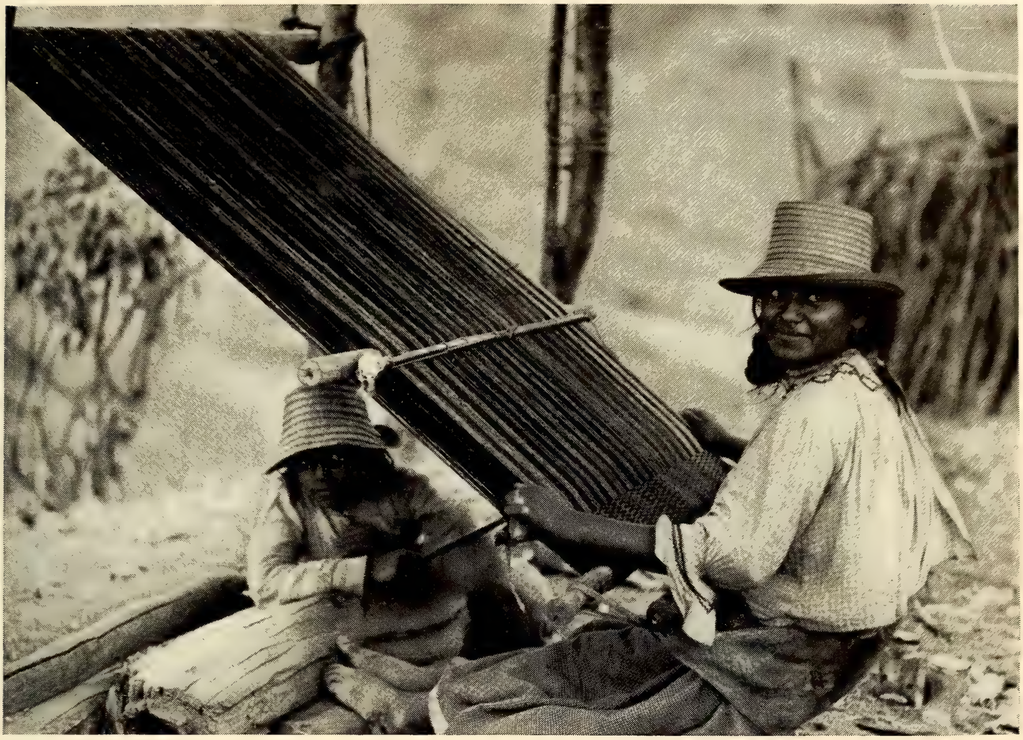
In the warm lowlands cotton is grown and worked up into textiles in a similar fashion, the cotton yarn being spun in finer diameters, as a rule, than the woolen yarn.

Still another fiber is obtained from the *cabuya*, or century-plant. It is long and strong and is used to make rope, being almost identical with the "sisal" grown for rope in Central America.

The Ecuadoreans are very skillful at hat-weaving, and make not only the cheap hats for the laboring classes, but the world's finest Panama hats, the centers of the latter industry being Montecristi and Jipijapa.

ECUADOR IS RICH IN ANIMAL LIFE

Ecuador is rich in animal life. Many of the forms are so similar to the life we see about us in the States as to occasion little comment or wonderment, but many



THE ECUADOREAN LOOM IS A CRUDE BUT MOST INGENIOUS CONTRIVANCE

The yarn is drawn taut by the weight of the woman, who sits in a broad web at the bottom of the loom. Although only simple designs may be woven on this pattern of loom, very harmonious blending of colors and shading are often noted.

others are strikingly different and certain to arouse interest.

In common with all tropical countries, Ecuador has an abundance of invertebrates, hosts of insects and creeping, crawling manifestations of life.

In the lower elevations mosquitoes are often a serious menace, since both *Anopheles* and *Stegomyia,* fever-carrying genera, are common; but as soon as any very great elevation is attained, the danger from mosquitoes is practically nil. The hot lowlands are the home also of myriads of ants, in numbers seldom to be found in northern climes.

The brilliant butterflies seen in so many tropical countries are present in great variety in Ecuador, and one of the pictures most apt to be carried away in the memory of the visitor to Ecuador is that of a huge blue *Morpho* floating aimlessly through the dark-green jungle vegetation.

The brightest bits of color one sees, however, even vying with the orchids, are those produced by the plumage of some of the birds. The avifauna of Ecuador is very rich and it is especially so in species of striking or gaudy coloring.

HOME OF THE HUMMING-BIRD

Probably in no other country of the world are there so many species of humming-birds, and nearly every one is beautifully marked. Brilliant metallic greens, iridescent blues and purples, clearest crimson, and snowy white are all to be found in the plumage of these buzzing, meteoric bits of bird life, and their activity is such that they are made doubly conspicuous.

When one thinks of the Andes the bird which is inevitably associated is the condor, the largest of the flying land birds. While the condor is found in Ecuador, it is a bird of the higher elevations, and so is not often seen by the casual traveler.

Once seen in its native surroundings, the condor will never be forgotten, and I shall ever treasure in my mental picture-gallery the sight of one which passed over our party at a height of less than one

VISITORS AT THE AMERICAN PARTY'S CAMP IN THE CORDILLERA DE CHILLA

The Ecuadoreans are a very friendly people and fond of paying visits. This family arrived very early in the morning, when the author was absent, but waited for his return at noon, and then spent the afternoon. To these dwellers of the interior Andes the tin cans which were thrown out from the camp were as gifts from the gods, and the camp never suffered from an accumulation of such things.

hundred feet. It was early morning and cold, the trail was over a high, interandean plateau at about 11,000 feet elevation, and I sat on my saddle mule, bundled up and trying to keep warm, while overhead a great black bird, seemingly superior to those forces of nature which were so bleakly apparent to me, sailed majestically up into a stiff wind, rocking slightly to the gusts, its only visible wing movement a slight spreading or closing of the primaries.

DENSE FORESTS ON BOTH ANDEAN SLOPES

Along the lower slopes of both the Western and the Eastern Andes are to be found great expanses of forest, that of the Eastern Andes extending unbroken for many hundred miles.

A forest of this type at its best is a dense tangle of vegetation, a green mantle which covers the hillsides so completely that it is impossible for any one looking out over the landscape to see a square foot of open ground.

The principal forest trees are large and very tall, most of them of a type that branches widely, so that the leaves form a continuous canopy overhead.

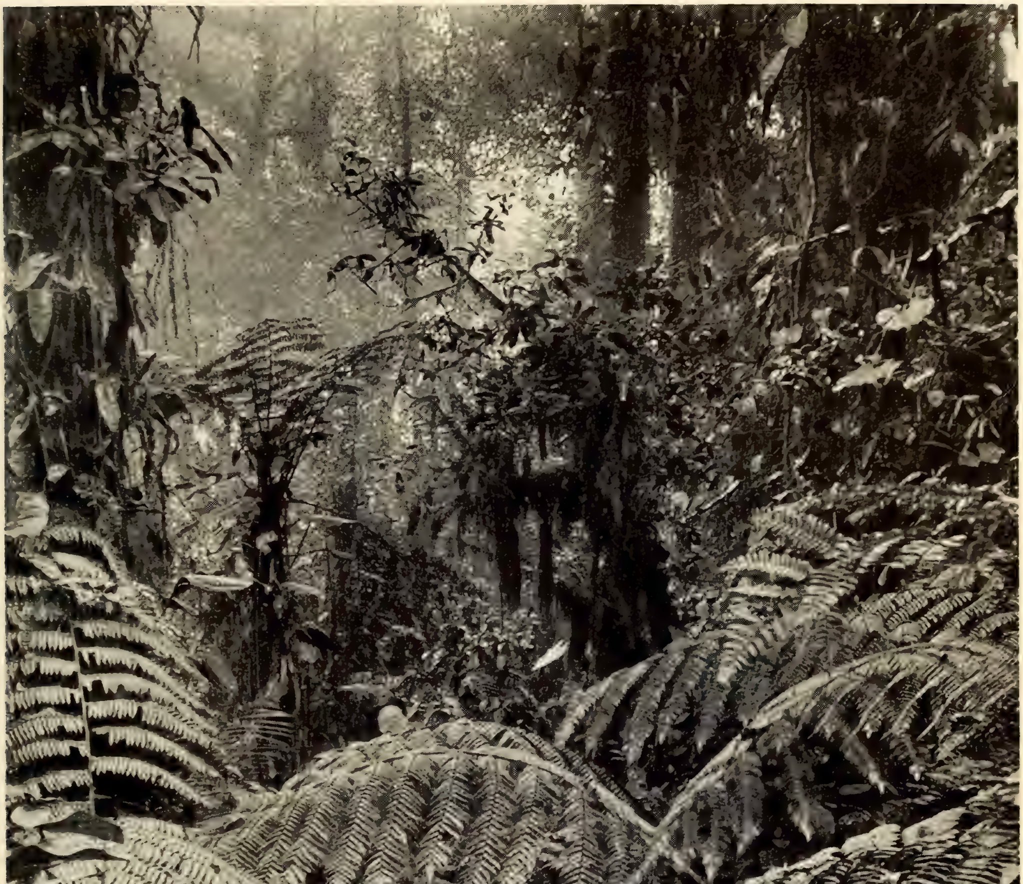
Most of these trees are varieties unknown to northerners, among the commoner of them being the rubber-tree, wild fig, silk-cotton, or ceiba, and mahogany.

Many of the trees have great, wide-flung root systems, which send out writhing members, like the tentacles of an octopus, to twist about and seek out any crevice on the hillside.

AN ENDLESS NETWORK OF CREEPERS

Smaller trees establish themselves under the forest giants wherever enough sunlight filters through the mosaic above to support them.

Over all of the trees, large and small, runs a vast and seemingly endless network of creepers and vines, *bejucos* the natives call them. These lianas are of all sizes and descriptions, from the merest thread-like filaments to hawser-like vines



GIANT FERNS OF THE ECUADOREAN JUNGLE

Great banks of these plants thrive in the damp, dark shelter of the jungle, being similar in appearance to some of our northern ferns, much enlarged. The graceful curves of the fronds, the delicate detail of the smaller structures, and the refreshing greenness of their color, all contribute to create a lasting impression upon any one who sees them at their best.

THE HONEY-BEAR OF ECUADOR IS A FRIENDLY LITTLE BEAST

With no immediate relatives in the United States, the *kinkajou* (or honey-bear) can be likened to no animal of popular knowledge. He is nearest to the raccoons in structure, but is a much prettier, more graceful animal. *Kinkajous* make charming pets, with their soft, close fur, a golden yellow in color, large, expressive eyes, and hands that are as capable as those of a monkey.

of great strength; and they mount serpent-fashion around the tree trunks or go searching head downward in fantastic loops and free swinging ends.

Parasitic air-plants, bromelias and orchids, grow in profusion upon the limbs and trunks of the trees, and mosses and ferns take advantage of every possible foothold. Many of the large trees carry on their limbs a greater mass of parasitic and epiphytic growths than they do of their own foliage.

THE HOWLING MONKEY HAS A TERRIFYING BELLOW

The bromelias serve as catch-alls for the falling leaves and debris from above, so that the crotches of the large boughs support great collections of humus and miniature forests of orchids and dainty, graceful ferns.

The howling monkey, more than any other animal, typifies these vast, unbroken forest areas, for it is absolutely dependent upon continuous forest; and its call leaves a more vivid impression upon the listener than any other noise of the jungle.

The call, given oftenest just before or during a rain or when the troop is alarmed, is a heavy, reverberating bellow, which fills the forest with its volume and at times seems to make the very air shake.

There is something sinister about the call of this monkey which makes one imagine that it is made by a very large and powerful creature.

Other mammals of interest in Ecuador are the spectacled bear, the only representative of the bear family found in South America; the tapir, the largest quadruped native to the Southern Continent; the jaguar, the beautifully mottled and spotted ocelot, the peculiar, long-snouted anteaters, the kinkajou, the coatimundi, and a great variety of opossums.

There are many varieties of harmless snakes, from small grass-snakes and slender, green tree-snakes, up to the boas, which may be fifteen feet or more in length. The two principal snakes of venomous attributes are the fer-de-lance, and the coral snake. The Indians of the *Oriente* are said to have an antidote for the bite of these reptiles, a plant which grows in the jungle there.

A LAND OF ONE RAILROAD AND MANY TRAILS

Ecuador might be truthfully called the land of trails; for, aside from the one short piece of railroad, almost the whole republic is dependent upon mule trails as lines of communication. Especially is this true of the central and southern parts of Ecuador, where the towns and villages are separated from one another by several days' travel over terrific mountain trails.

The Ecuadorean trail is something that must be traveled to be appreciated. In the open areas, where the field of vision is extensive, almost every ridge will be seen to carry a trail, which stretches off like the folds of a gigantic serpent crawling over the mountains. It is seldom that one is restricted to a prescribed route; he may take a choice of trails.

One *sine qua non* of these trails is that they must climb—it makes no difference whether up or down—and so the traveler soon learns to look ahead and forecast where his route will lie. He may be certain, beyond all peradventure of a doubt, that it will cross the highest ridge in his horizon.

Because of the steep slopes of the mountains, there are only two possible places for a trail, as a general rule—one up the valley of some stream, the other along the crest of the mountain range.

THE TRAVELER HUMORS HIS MULE ON THE HIGH TRAILS

It is not always easy to say which practice is most to the liking of the wayfarer. From Santa Rosa in to the mines at Portovelo, we crossed the Rio Santa Rosa twenty-two times in one half day, when the trail followed up the cañon; while on another jaunt, north along the interandean region, where the trails keep to the ridge crests, we frequently climbed laboriously up to 12,000 feet only to find a deep river gorge ahead, which meant a descent to 7,000 feet and the climb all to do over again.

The traveler can ride mule-back over most of these trails, although occasionally a short stretch may be encountered where it is politic to walk. The trails frequently ascend and descend in the steepest of pitches and often run for long distances along the edges of precipitous slopes, where a misstep means a fall of two or three hundred feet before even the first bounce and perhaps a thousand to the very bottom. In such places it is best to humor the mule.

Disagreeable stretches of a different nature are found where the rains soften the surface of the trail, and the feet of the mules cut it up into a succession of ridges and furrows, known locally as *camellones*. The animals go sloshing over these *camellones,* stepping high over the ridges and slopping down into the furrows, which are often knee- or belly-deep.

FEW LLAMA TO BE SEEN IN ECUADOR

It is over such trails as these that all the commerce of interior Ecuador is carried, and the Ecuadorean has come to be very expert as an *arriero,* or driver of mule trains.

BUT NO ONE EXTOLS THIS KITTEN'S DISPOSITION

The cougar, or puma, is not rare in Ecuador, and in some regions is apt to prove destructive to domestic stock. The governor of the Province of Loja had this kitten as a pet, and even at such a tender age it is possible to note the parentage in the lines of the head and the large paws.

The mule is the prime favorite as a pack animal, although some horses are used and numbers of donkeys may be seen. About Riobamba a few llamas were seen; but this animal is almost a curiosity in Ecuador and is not the common animal that it is in Peru.

The mule can carry one hundred pounds on a side, a total of two hundred pounds to the animal, or, on good trails, up to three hundred pounds, and, if an arriero is clever, it is possible to take some amazing cargoes in over the trail. I have seen steel cable going in to the mine when it took fourteen mules to carry one section. Each mule had a few coils on its back, and then the cable ran back to the next animal, and so on down the line.

ONCE A PART OF THE GREAT INCA EMPIRE

Pianos have been taken over the Andean trails where it required one hundred peons a month to bring such a cumbersome burden to its destination.

The early history of Ecuador is a most interesting and romantic one. Under the Incas, it was a part of the great Empire of Peru, and the northernmost stronghold of Indian power was at Quito. Inasmuch as a great deal has been written of early Peruvian history and the pages of this magazine have set forth considerable of the Inca narrative, the repetition of the general account will not be attempted here.*

The Spaniards, at the earliest opportunity, spread out and overran Ecuador in their search for treasure, both in its natural state and as it had been gathered by the Incas.

The first of the discoveries of any importance resulted in the establishment of the famous mines at Zaruma, in southern Ecuador. Here, just prior to 1550, the whites found a region so rich in gold that men were set to work to dig it out.

In the early days the gold was extracted by crude methods and inefficient equipment, but today, under an American company's management, the camp is a model of up-to-date methods and a demonstration of what Yankee energy and initiative can accomplish in the tropics. A forty-stamp mill runs day and night, while the ore is treated in vast cyanide tanks, with a capacity of several hundred tons per day.

A large force of natives, under American supervision, brings up the ore from depths as great as 900 feet or from outlying workings on adjacent hills. Hundreds of mules wind in over the two-day trail from Santa Rosa, the port of supply for the Zaruma district, each month, a continuous train of supply being necessary to keep the camp going, for everything that is consumed must be brought in by pack animal.

Concrete houses, well screened, shower baths and a swimming pool, tennis courts, distilled water, ice, electric lights, and a hospital—all these combine to make the mining camp of Portovelo an oasis of Yankeeland in a desert of undeveloped Spanish America, and the generous hospitality of the company officials makes a sojourn at this oasis doubly attractive.

A fabulous sum of gold has been taken from the Zaruma region in the course of the last three and a half centuries, and there are probably upward of fifty miles of workings in the hills thereabout.

FEW EVIDENCES OF INCA OCCUPATION

The evidences of Inca occupation have been for the most part extirpated, evidently much more so than in Peru, for only here and there can one see portions of the old highways. Of course, it is not improbable that extensive areas of Inca construction have been so overgrown that they would not be apparent without much expenditure of labor in clearing away and cutting down forest.

There are said to be Inca ruins not far from Zaruma, on a very steep and heavily wooded mountain, rather inaccessible and difficult to investigate. The natives say that on top of this mountain there is an enchanted lake, and they give as unmistakable proof that it *is* enchanted the fact that it always disappears when any one climbs to the summit to see it! Could any one ask for more irrefutable evidence?

AIRPLANES MAY AID ECUADOR

Ecuador is today one of the least developed of the South American republics, this condition being due in a large measure to the rugged topography of the country, which makes construction of roads and railways an almost prohibitive procedure, and to the fevers and plagues which acted as a deterrent to outsiders who might have wished to develop the region. Now the latter have been mastered to such an extent that they should no longer be a vital factor, and the Ecuadorean Government is wide-awake and anxious to encourage foreign capital to give it help for the development of its abundant natural resources.

As a mark of the attempt to keep abreast of the times are the flights made across the Andes by airplane, and it is not inconceivable that with the development of airplane transportation the difficulties of terrain will be overcome as well.

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* See "In the Wonderland of Peru," April, 1913; "The Story of Machu Picchu," February, 1915, and "Further Explorations in the Land of the Incas," May, 1916, by Col. Hiram Bingham, and "Staircase Farms of the Ancients," by O. F. Cook, May, 1916.

OVER THE ANDES TO BOGOTÁ

By Frank M. Chapman *

Curator of Birds, American Museum of Natural History

THE lure of Colombia's manifold resources has long exerted its influence on the prospector, whose love for exploration is tempered by a desire for some tangible return for the effort expended. Gold and platinum, ivory nuts, rubber, orchids, and, more recently, oil, have all drawn hundreds of eager seekers for wealth to her vast and varied territory.

But to those who love travel for the wealth of experiences it may bring, who revel in glorious scenery, who find fresh interests in new or strange forms of vegetable and animal life, and in the customs of foreign peoples, Colombia is almost an unknown land.

Cartagena is occasionally visited by tourists, and Santa Marta, lying at the base of the superb group of snow-crowned mountains of the same name, may be known to those who travel on fruit-bearing steamers; but Barranquilla, the metropolis of northern Colombia, is twenty miles from the sea; Buenaventura and Tumaco, her only Pacific ports, are not familiar as names to even most traveled people, while Bogotá, her capital city, with a population of 130,000 or more, seems as remote as Lhasa.

This is all wrong. It is high time Colombia's attractions for the tourist were more widely known, and as a means toward that wholly desirable end I propose to outline here a Colombian tour, on which any one who can sit astride a mule may embark with the assurance that he will not be exposed to more hardships than the traveler off beaten trails expects to find. In retrospect these minor discomforts often become positive pleasures, or, at any rate, the bases of those tales without which travel would be merely uneventful transportation.

NO RISKS TO LIFE, LIMB, OR PROPERTY

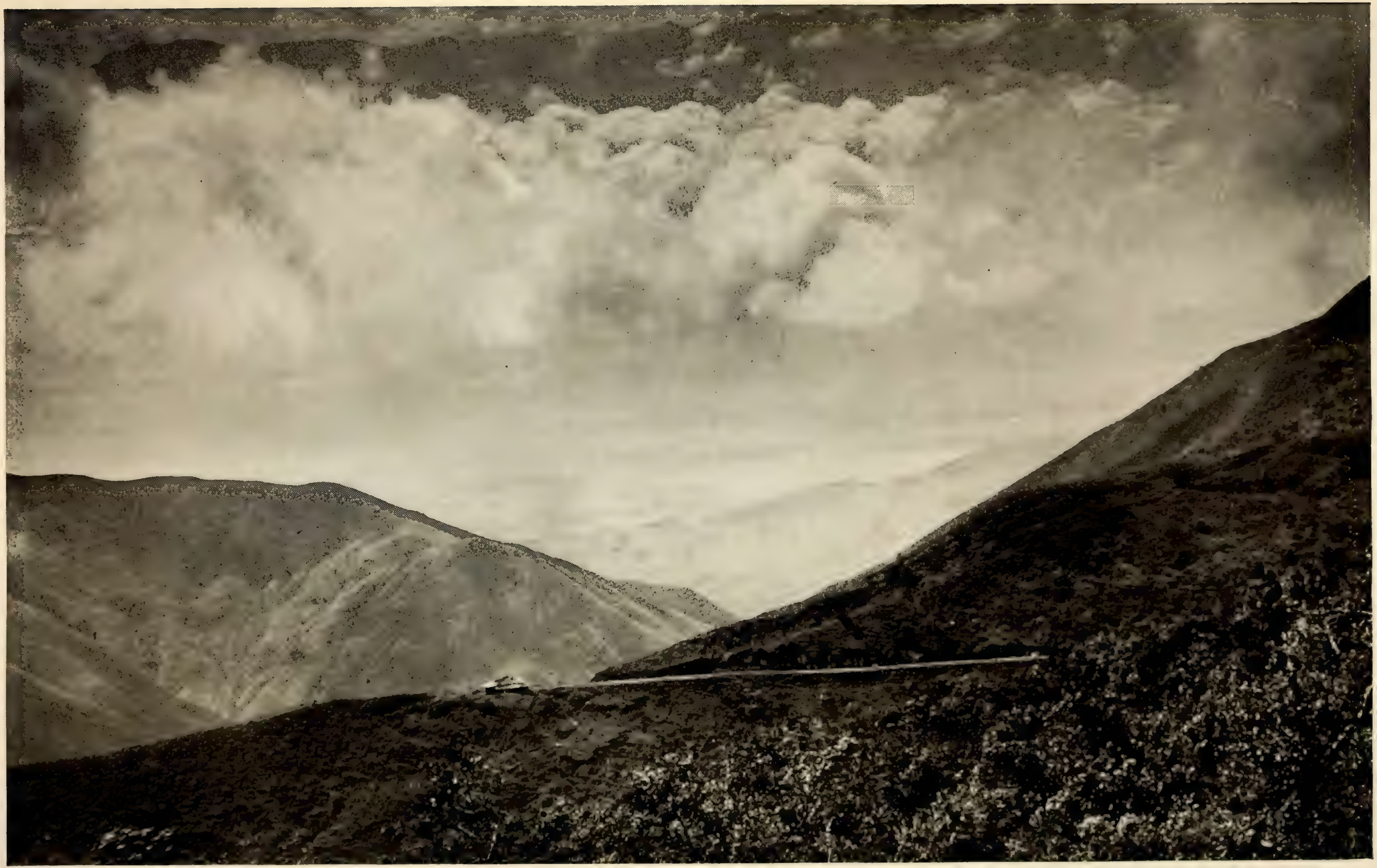
As for risks to life and limb, I know of no safer country than Colombia. The "hold-ups" and other forms of highway robbery of daily occurrence in many large cities in the United States are practically unknown in Colombia.

During the six years when parties from the American Museum explored the republic from end to end, we lost not one single article from an equipment a large part of which — camp utensils, guns, knives, etc.—must have seemed highly desirable in native eyes. Indeed, I recall that on passing through a small town where we had previously established our headquarters a woman ran out to give us a needle and thread one of our men had left sticking in the wall of his room!

Our work brought us into contact with men of every class, and from high and low alike we received only courteous and hospitable treatment. Where we brought letters of introduction, this might have been expected, but where we came unknown and unannounced we were invariably welcomed and given every available facility to pursue our natural-history researches—this, too, it must be remembered, at a time when North Americans, as a nation, were far from popular in Colombia. But I have always found in Latin America that an individual is accepted or rejected on his own merits or demerits without regard to his nationality.

During the World War Colombia is said to have sympathized with the Central Powers, but I know of a city from which a German was expelled because he refused to rise when the band played our National Anthem, while an American, who possessed that measure of tactfulness, courtesy, and consideration for others which are included in the Spanish word *simpatico,* was the most popular foreigner in the town. In a word, then, the traveler may go unarmed, and so long

* From 1911-1915 the author of this article directed a biological survey of the Colombian Andes for the American Museum of Natural History. The results of his researches in field and study are embodied in a 700-page Museum bulletin on the "Distribution of Bird Life in Colombia." In this volume, which was awarded the Elliot gold medal by the National Academy of Sciences, the life-zones of the Colombian Andes are defined and an attempt made to determine the origin of their bird life.—Editor.



Photograph by Frank M. Chapman

CAUCA VALLEY FROM SAN ANTONIO PASS, IN THE WESTERN ANDES, AND, ABOVE THE CLOUDS, THE CENTRAL ANDES

"The curtain of clouds gradually lifted, revealing beneath it the level floor of the Cauca Valley, with gleaming streams and lagoons and varicolored areas of marsh, pasture, and forest. Above the clouds rose the purple summits of the Central Andes."

as he is within reach of habitation, he may be assured of shelter and a welcome according to his deserts.

So far as one's "limbs" are concerned, there is a curious idea current that one is in greater danger in little-traveled, remote places than when at home, whereas exactly the reverse is the case. On hearing that I was about to visit Colombia an accident insurance company in which I held a policy notified me that they should consider their risk canceled until I returned, whereas during the entire trip I ran fewer risks than were encountered in motoring the length of New York City the day of my return!

An American in the Cauca Valley who attempted to drive a carriage rapidly over a mule trail met with a wholly-to-be-expected disaster and broke his collar-bone; but the case was so rare that more than a week passed before the local physicians called in succeeded in discovering the fracture.

In traversing the Andes bits of trail are occasionally encountered which you observe with greater satisfaction over your mule's tail than between its ears, but in the dry season, at least, such places are much less dangerous than they appear to be and, in any event, there is none on our proposed route.

It remains now to speak of the climatic conditions one may expect to encounter as they affect the health, comfort, and transportation of the traveler. So far as temperature is concerned, there is essentially no variation through the year. Observations made at the estate of La Manuelita, in the Cauca Valley, show a difference of only six degrees in the average weekly temperature of the entire year.

A RECORD OF FOUR HUNDRED INCHES OF RAIN IN A YEAR

Seasons, then, near the Equator are not marked by changes in temperature, but by the amount of rainfall. Generally speaking, the year is divided into wet and dry seasons, known respectively as *invierno* (winter) and *verano* (summer), though there is much variation as regards the time and duration of these seasons, particularly in mountainous regions.

There are also areas where it rarely, if ever, rains, and others still where rain falls on practically every day in the year. In the Pacific Coast region of Colombia the wet season is continuous, and there is a recorded rainfall at San José of 400.88 inches. So far as I know, this record has not been exceeded in the Western Hemisphere.

However, we pass through this saturated area by rail, and climatic conditions (provided they do not annihilate roadbeds and bridges) do not concern us. As for the rest of Colombia, we may visit it any time between the end of December and early May with the prospect of finding favorable weather conditions.

EQUIPMENT FOR THE TOUR

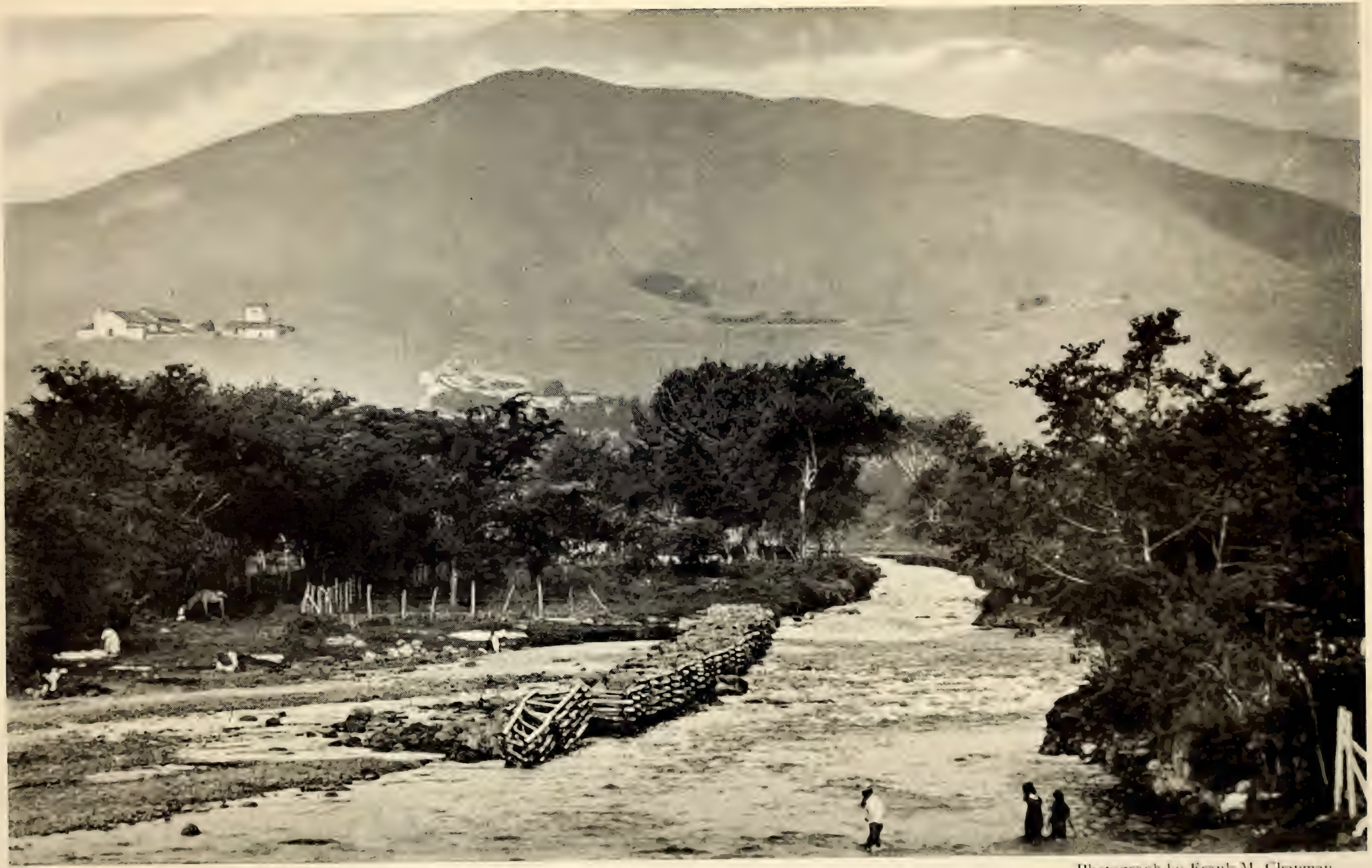
A word now on equipment and we shall be ready to embark. Both fall and summer clothing will be required, the former for the Temperate, the latter for the Tropical Zone. Personal effects, in which I should include riding gear and raincoat, may be carried in a small fiber "army" trunk measuring 31 inches in length.

This will form one-half a mule-load; the other half will consist of a folding cot, with two pairs of double blankets, a cheese-cloth mosquito-bar, and enough of one's heavier clothing, all in a large duffle-bag, to balance the weight of the trunk. One pack-mule will carry a small trunk and two sleeping outfits, and thus serve two travelers.

It is advisable to take a saddle, saddlecloth, and saddle-bags. A small-sized McClellan, fitted with crupper and breast strap and with short girths, will be found serviceable. A dozen would-be purchasers will clamor for this outfit at your journey's end.

It is not necessary to take a supply of food, but a spirit lamp with solid alcohol in tins, bouillon cubes, tea, and a "tea-ball" will insure your having the "makings" of a hot drink when it might not be otherwise available and at a time when it may be vastly comforting. A small supply of quinine, a cathartic, some form of antiseptic, and a package of pyrethrum used dry as a flea powder and burned as a smudge should mosquitoes be troublesome, complete the more special items of our outfit.

In this day of rapidly fluctuating exchange and charges, one cannot speak



Photograph by Frank M. Chapman

THE WESTERN ANDES FROM THE BRIDGE OVER THE CALI RIVER: COLOMBIA

This river flows through the city of Cali. It is the laundry and bathing-place of a large part of the population, whose aquatic activities form a never-failing object of interest to the stranger.

with exactness of the expenses incident to travel in South America. On my second Colombian journey (1913) I paid $80,000 for ten mules. A Colombian dollar (peso) was, however, then worth only one cent gold, and my mules cost me, therefore, only $80 each.

But mules as well as pesos are subject to variations in value and one cannot predict what they will cost at any given time. Still, one may be assured that the *per diem* charge for travel in Colombia will be much less than in the United States, even if the mileage is not so great. A letter of credit on banks in Barranquilla, Bogotá, Cali, and other Colombian cities may be obtained in New York.

HOW TO GET TO COLOMBIA

Since we propose to follow routes which have been highways of trade for at least four centuries, a deaf-mute with a written itinerary could not go astray on them; but, assuming that the traveler has both the power of hearing and of speech, he will widely increase the range of his experiences, and doubtless add not a little to the gaiety of Colombia by acquiring at least a phrase-book knowledge of Spanish before he starts. In any event, he should take the phrase-book itself, with the certainty that he will not lack for willing, considerate teachers, who, whatever they may do behind his back, will exhibit an astonishing control over their facial muscles in his presence.

These preliminaries disposed of, let us turn to our maps and trace the routes of the several lines of steamers which ply between New York and Cristobal, Panama. Arrived at this cross-roads of commerce at the end of an approximately seven-days' voyage, we disembark to continue our journey to the port of Buenaventura on a west-coast steamer, over whose stern, when docking, we may almost have run our bowsprit.

LEAVE ALL HASTE BEHIND

Who enters the tropics should leave all haste behind. We have a superior way of talking of the land of *"mañana,"* quite overlooking the fact that the physiological law of the land is expressed in the *"mañana"* attitude. With the cumulative energy of generations of Temperate Zone born ancestors in our veins, we may maintain our standards of push and speed in the tropics for a time, but that is no reason why we should expect people who have been reared under less favorable climatic conditions to live up to them.

Indeed, it is highly advisable to leave *all* of our preconceived standards at home. Latin Americans have been long subjected to climatic and other influences which have of necessity profoundly affected them both bodily and mentally. We must remember also that, racially, we are as far apart as were the Conquistadores from the Pilgrim fathers.

Let us therefore accept as a fact that our habits of thought are fundamentally different and give to history, tradition, environment, and heredity their share of praise and of blame for existing conditions.

If, therefore, our west-coast steamer does not leave immediately after our arrival at the Isthmus, let us be thankful for an opportunity to see more of the Canal Zone than we could observe from the steamer during our transcontinental voyage across the Isthmus.

The very pier on which we land gives us an object-lesson in the fascinating history of the exchange of raw materials for finished products. Northbound copper from Peru and Chile; cacao and ivory nuts from Ecuador; hides from Colombia, here meet and pass automobiles and sewing-machines, shoes, and dress goods on their way south.

Incidentally, we may learn that already we are south of the latitude of Caracas; that Colon, on the Caribbean, is farther west than Panama, on the Pacific; that at the last-named city the sun rises as well as sets over the Pacific, and other local geographical facts to which stay-at-homes are strangers.

Once through the canal and past the guns at Forts Amador and Flamenco, we enter the Bay of Panama, to my mind the most beautiful harbor, next to that of Rio, in tropical America, and are fairly embarked upon our journey. Thus far we have been sailing, as it were, under sealed orders, and as we steam slowly and smoothly down the coast to Buenaventura we may open our papers and examine our proposed itinerary.

The chief objective of any tour in Colombia is naturally Bogotá, its capital and

Photograph by Frank M. Chapman

THE APPROACH TO CALI

As one descends the eastern slopes of the Western Andes into the Cauca Valley, a turn in the trail, just after crossing the foaming Cali River, reveals the city of Cali in the distance.

largest city. We will therefore go to Bogotá, but over a far more interesting route than the one up the Magdalena River from Barranquilla, near its mouth, usually followed by travelers to that city. We shall be somewhat longer on the way; but time, I repeat, is not of the essence of our journey.

To visit Colombia and not see the Cauca Valley would, in my opinion, be an even greater omission than to fail to visit Bogotá. From Buenaventura, consequently, we will cross the western Andes to Cali, metropolis of the fertile, healthful, and beautiful Cauca Valley; sail down the Cauca River to Cartago, whence we cross the Central Andes over the Quindio Pass to Girardot, on the Magdalena River. Here we may take the train for Bogotá, returning, if we like, the same way, or, better, by mule to Honda, farther down the river.

From La Dorada, a few miles below Honda, we begin our voyage down the Magdalena to Barranquilla, where we are within 18 miles of Puerto Colombia, whence we may take passage for New York. It will be observed that this route crosses two ranges of the Andes; takes us from sea-level in the Tropical Zone to 11,000 feet in the Temperate Zone; requires no doubling on our tracks, and makes all of our river routes down-stream, a matter of no small importance. (See the Map of South America, issued as a supplement with this number of THE GEOGRAPHIC.)

A FIFTY-DAYS' JOURNEY FROM NEW YORK

The actual traveling time from New York and return required for this journey is about fifty days, of which not less than thirty may be passed in Colombia, where our methods of transportation will afford both time and opportunity to observe the country, its products and people, en route.

Buenaventura, about half-way down

Photograph by Frank M. Chapman

A CALI PATIO

The *patio* of a Latin-American house of the Spanish type is the focal point of home life. Almost invariably it is shared by a number of pet birds, in and out of cages. The little white egrets in this picture were semi-domesticated and with them were several equally tame tree ducks.

Colombia's Pacific coast, is distant some 360 miles, or about two days' journey, from Panama. Possibly no port in South America will be proportionately more benefited by the opening of the Panama Canal than Buenaventura. Possessing an excellent harbor and railway connection with the highly productive region east of it, Buenaventura has a promising future; but its present cannot be spoken of with enthusiasm.

Situated on a small island, surrounded by a network of mangrove-bordered lagoons, under skies from which rain falls almost continuously, Buenaventura is not a Garden of Eden. Its population of some 3,000 is composed chiefly of negroes who can endure the climatic conditions. The only resident whites are the cable operator and agents of shipping firms, whose presence is demanded by the needs of their occupation.

Our first expedition reached Buenaventura aboard the venerable steamer *Quito* at 4 o'clock of a March afternoon. As usual, it was raining. Customs, we learned, closed at 5, the next train left at 7 o'clock the following morning, and there would not be another for three days. Even from the steamer, Buenaventura looked as though it deserved everything evil that has been said of it, and closer inspection confirmed first impressions.

The possibility of having to spend three days in, to put it mildly, so unattractive a place brought the first conflict between "push" and *"mañana."*

Reaching shore in a canoe through the courtesy of the port physician and the further able assistance of a broad African back and stout legs, I found Richardson, our Museum representative, awaiting me, and jointly we paid our respects to the Administrador de Aduana — in other words, the customs officer. To him I presented a letter of introduction from the Colombian Minister at Washington, describing our plans so eloquently that,

Photograph by Frank M. Chapman

THE CAUCA VALLEY, SHOWING THE "FARALLONES," OR SUMMITS OF THE WESTERN ANDES NEAR CALI, FROM THE HACIENDA LA MANUELITA

after due consideration, the administrador assured us no custom examination was necessary.

The train of negroes that by this time had begun to arrive with the first of our thirty-odd trunks, bags, and boxes, was therefore diverted to the warehouse of our local agent, where our equipment was deposited for the night.

FORTY YEARS TO BUILD A 60-MILE RAILROAD

Early the following morning its transfer by man-power to the railway station was well under way when a dignified gentleman informed us that the captain of the port had reversed the decision of the administrador and that we must submit to custom-house inspection. As the captain, however, was still sleeping, we assured his representative that we could recognize only the authority of the administrador. We proceeded, therefore, with the shipment of our effects, and, thanks to this successful combination of Yankee push and Colombian courtesy and "*mañana*-ism," we made our exit from Buenaventura.

Owing mainly to a shortage of funds and an excess of floods, the railway from Buenaventura to Cali, distant in an air line only 60 miles, was under construction for forty years. It follows the Dagua River, for a short distance a broad, smoothly flowing stream, then a dashing torrent fed by dozens of foaming brooks which plunge down the mountain slopes to meet it.

Only the passage of trains prevents the forest from reclaiming the right of way. Vegetation flourishes with a luxuriance proportioned to the excessive rainfall, which is mainly responsible for it. With ear-piercing squeals and shrieks, the train winds its way through leafy tunnels. There are palms of many species, cecropias and bamboos, with ferns, arums and red-beaked heliconias, and a profusion of parasitic plants in endless variety.

Photograph by Frank M. Chapman

FERRYING ACROSS THE CAUCA RIVER IN THE SHADOW OF CEIBA TREES

Dust is here unknown, and I was impressed by the cleanness of the foliage, every leaf of which received a daily shower. Nor did a knowledge of the fact that these rain-soaked, almost impenetrable, forests are inhabited by many species of birds found in no other part of the world detract from the interest with which Louis Agassiz Fuertes, the artist of the expedition, and I observed them.

In March, 1911, when I visited this part of Colombia, the railroad which now reaches Cali was not completed beyond Caldas, 2,500 feet above, and about five hours from Buenaventura.

Caldas lies in a basin-shaped valley, the western rim of which, throwing what is technically known as a "rain-shadow," robs the immediately surrounding country of the precipitation which so strongly characterizes the Pacific slope of the Western Andes in Colombia. As a result the forests through which we had just passed, and which crown the mountains above us, are here replaced by grass-covered hills with scattered cacti and acacias, representing the flora of an arid region.

This was the first of many instances where personal observation was found to be absolutely essential to a proper interpretation of faunal problems. It would be out of place to enlarge upon this theme here, but I cannot leave it without emphasizing the importance of field-work in zoögeography, and the futility of attempting to determine the boundaries of faunal areas and the laws governing the distribution of life merely on the basis of a laboratory study of specimens.

BIRDS RESTRICTED TO CLEARLY DEFINED ZONES

The irresistible combination of a religious fiesta and a wholly secular circus so delayed the assembling, packing, and saddling of our impressive array of mules that we left Caldas the following morning at too late an hour to reach Cali the same day. The night therefore was passed at Rancho El Tigre. We were now, however, in no haste. The back of a mule affords excellent opportunities for reconnaissance. The pack animals set the pace of three miles an hour and rarely did we care to increase it. Barometer in hand we observed the changes in altitude and noted their effects on the distribution of life.

As we became familiar with the birds and learned to recognize them at sight and by voice, we could predict with surprising accuracy when certain species would appear and when they would in turn be replaced by others. In spite of their mo-

Photograph by Frank M. Chapman

THE MARKET-PLACE AT CARTAGO

The town of Cartago was founded in 1540, at a site distant 15 miles from the present one. Here begins the ride over the Quindio Trail to the Magdalena Valley.

bility we discovered that most birds are as closely restricted to their respective zones as if they were confined to them by actual barriers. Under favorable conditions I have seen these zones, or life strata, so sharply defined that a five minutes' walk has completely changed the character of the bird-life by which I was surrounded.

The first 3,000 feet of our ascent from Caldas was made over bare, sunburned hills, but at an elevation of 5,000 feet above sea-level we got beyond the "shadow" of the outlying westerly ridge and entered the lower border of the Cloud Zone.

At once the grassy slopes gave way to even more luxuriant forests than those of the lowlands. New birds appeared. We had left the Tropical Zone behind us and entered the Cloud or Subtropical Zone which, we subsequently discovered, extends up the mountain sides to an elevation of from 9,000 to 9,500 feet.

A TRAVELER ALWAYS CARRIES HIS OWN SLEEPING OUTFIT

Our first experience as uninvited, unannounced guests in a Colombian home was typical of many subsequent ones. Rancho El Tigre is a modest establishment, but whatever it possessed in the way of food and sleeping quarters was with overflowing cordiality placed at our disposal.

A traveler in Colombia always carries his own sleeping outfit. All he requires, therefore, is a corner in which to place it. My pneumatic mattress greatly excited the curiosity of our hosts at El Tigre, and a judicious description of its value as a tester of one's lung-power so stimulated ambition to exhibit blowing ability that I had no difficulty in getting it inflated. A similar plan was used to advantage at high altitudes where lung-power is at a premium.

At El Tigre we tasted and enjoyed our first chicha, the national drink made of fermented corn. But chicha we later learned, like pulque of Mexico, varies greatly in character. A home-made brew with a history which will bear publicity is usually palatable and refreshing, but chicha of the stalls and shops is an able advocate of prohibition among the discriminating.

Free from the distracting influences of fiestas and circuses, we made an early start after a restful night at El Tigre, and at 10 the next morning reached the summit of the San Antonio pass, whence we had our first and long-anticipated view

Photograph by Frank M. Chapman

CROSSING THE RIO VIEJA

After leaving Cartago, and just before reaching Piedra Moller, travelers and their baggage are ferried across the Rio Vieja in a dug-out. The pack and riding animals swim. The charge for this service, pasture for the three animals, a night's lodging, dinner, and coffee in the morning, for three men, was $1.30!

of the Cauca Valley. It was raining when we mounted the divide and, to our intense disappointment, the half-flooded trail down the eastern slope of the range soon disappeared in the clouds—fog we should have called it at a lower altitude.

There is a primitive posada (inn) here where Richardson had but recently made his headquarters while collecting birds in the adjoining forests, and attractive Señora Apollonia in charge accorded her "Meester" friends a shy but cordial greeting and an emergency breakfast of sardines and plantains.

MULE-DRIVERS COMPRISE HALF THE MALE POPULATION

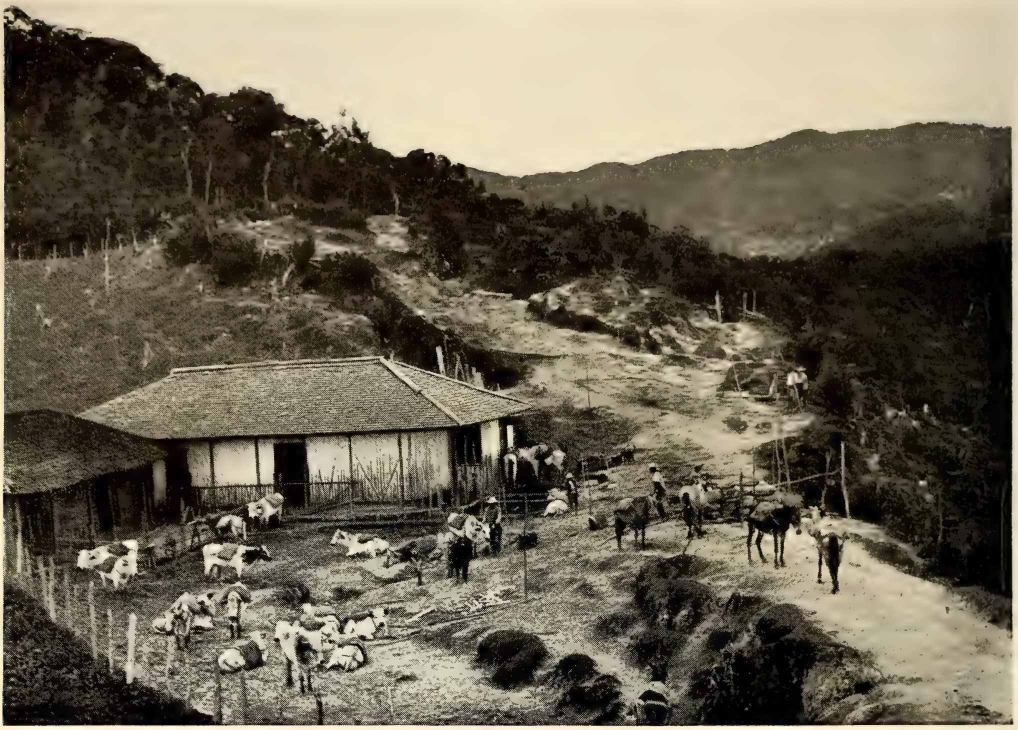
The small level place in front of the posada, whence the ground dropped abruptly both to the east and west, was constantly occupied by steaming pack mules with dripping arrieros (muleteers) adjusting packs to meet the requirements of a down instead of up grade. Over half of the male population of Colombia are said to be mule-drivers. This life is one of exposure and hardships calling for great endurance and ability to meet the disasters which sooner or later befall one on the trail, and it develops a set of picturesque vagabonds who play a leading part in any highway scene in Colombian life.

The Colombian mule is not large; he is rarely overfed, but is expected to carry a weight of 300 pounds without regard to grade or the condition of the trail. Frequently only the combined exertions of mule and arriero keep him on the road. The whip is not spared, but the arriero appears to depend chiefly on his vocabulary as a stimulant. With incredible eloquence he encourages, pleads, curses, and rages as circumstances require, and his voice is the most characteristic sound on Colombian roads and trails.

Not one of the arrieros who had reached the heights of San Antonio failed to sample a *copita* of Apollonia's *resicado*, a fiery white rum, the boy of twelve tossing his drink off with the matter-of-fact gravity of his seniors.

HOSTESS' FOUR-YEAR-OLD DAUGHTER SMOKES A BIG CIGAR

So far as we observed, Apollonia's four-year-old daughter had not acquired a taste for rum, but she had already laid the foundation of a habit which Colombian women, at least of the rank and file, have



Photograph by Frank M. Chapman

A POSADA IN THE TEMPERATE ZONE, ON THE QUINDIO TRAIL OF THE CENTRAL ANDES, AT AN ALTITUDE OF 10,300 FEET

A train of oxen, much used as pack animals in the Central Andes, is resting in the corral. Note the stunted trees of the Temperate Zone forests. The birds here were unlike those found at lower altitudes in the Tropical and Subtropical Zones.

acquired in advance of their northern sisters. Sitting cross-legged on a bench chattering baby-talk, she contentedly smoked a large black cigar, around or partly around which her tiny forefinger coiled in stereotyped form. Her mother gave her a light and seemed unfeignedly proud of her offspring's accomplishment.

The rays of the mountain sun gradually lifted the curtain of clouds from the scene below us, revealing beneath it the level floor of the Cauca Valley, with gleaming lagoons and streams and varicolored areas of marsh, pasture, and forest. Clouds still hung over the sunlit valley and above them rose the purple summits of the Central Andes, distant 40 miles or more. It was a scene of great beauty, made even more memorable when, on a subsequent occasion, we saw far to the south the three superb snow peaks of Mt. Huila.

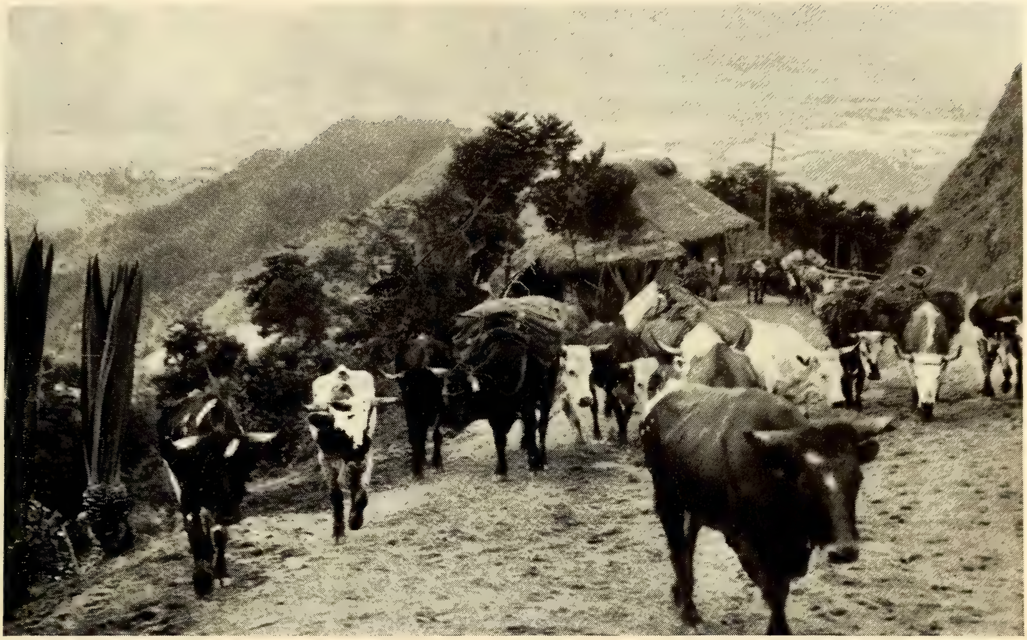
The moisture-bearing winds from the Pacific are condensed on only the western slope of the coast range. As a result the Cloud or Subtropical Zone forest ends on the summit of the range, the eastern slopes being grass-covered and devoid of trees.

The change in vegetation is as abrupt as the change in grade and serves further to illustrate the striking local effects of climatic and physiographic influences.

The homes of that remarkable assemblage of tanagers, motmots, toucans, trogons, and many other brilliantly colored birds which characterize and, in large part, are restricted to the Subtropical Zone, ended at the summit, and on the arid eastern slope few birds were found.

ARRIVAL AT CHARMING CALI

It was mid-afternoon when a turn in the trail showed us the attractive little city of Cali. Four stately ceibas form more fitting and impressive city gates than the hand of man could erect, and as we crossed the picturesque bridge over



Photograph by Frank M. Chapman

THE ASCENT OF THE CENTRAL ANDES ON THE QUINDIO TRAIL FROM IBAGÜE

Oxen are commonly used as pack animals on the Quindio Trail. They carry less than mules and travel only about half as far in a day, but in the wet season they are less apt to get mired.

the Cali River, which they guard, we experienced a definite sensation of arrival.

Cali, a city of some 45,000 inhabitants, is the metropolis of the Cauca Valley. Here the traveler will find excellent quarters and an agreeable, healthful climate, and if he wishes to study the life of a Latin-American city free from the cosmopolitanism of a seaport, Cali's streets and market-place, plaza and river-front will supply him with abundant material.

Possibly he may be asked to visit a sugar estate or cattle ranch in the valley where, if he be young and romantic, he may be so charmed by the semi-baronial life of a planter or ranchman that he will be tempted to become a Caucano.

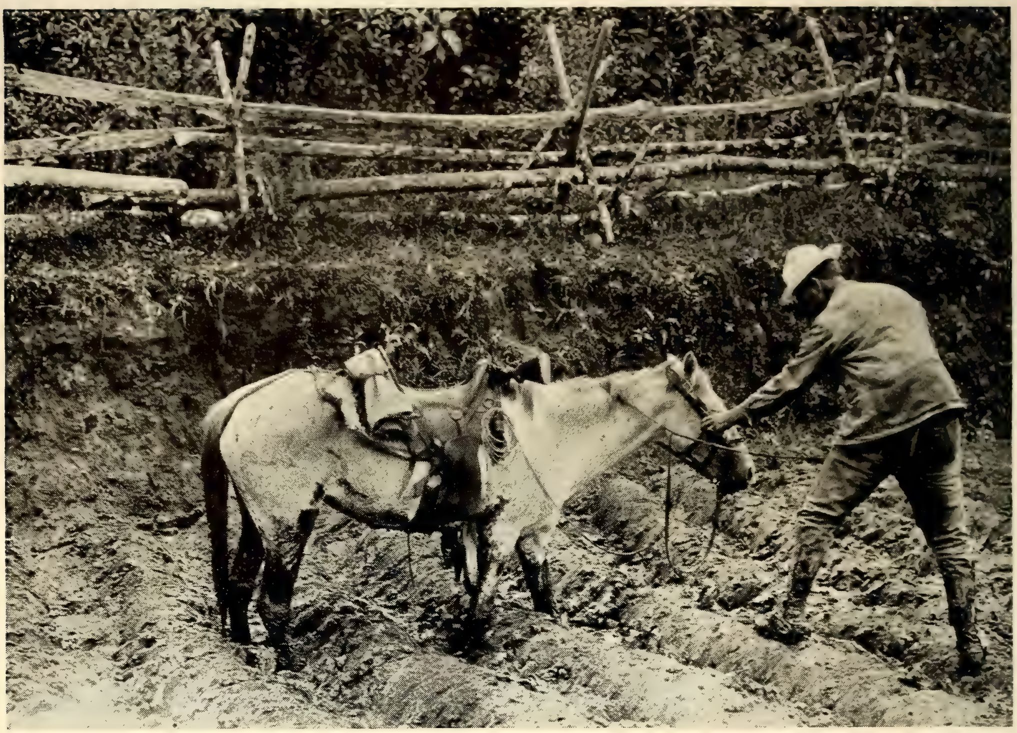
There are few places in the Americas which offer greater inducements to one who wishes to become a resident of the tropics. With an altitude of 3,500 feet above sea-level, and a moderate, evenly distributed rainfall, the valley possesses a white man's climate.

The soil is inexhaustibly fertile. There are sugar plantations on which cane has been known to grow continuously for 120 years without fertilization. Cattle thrive, and once a stand of para grass is established, it will feed one and a half head of cattle per acre without further care. The railroad now gives access to the coast, the Panama Canal, to the world, and the future prosperity of this favored spot seems assured.

The mountains which rise through brown, softly molded foothills to wooded summits not only supply a cloud-hung panorama on which shower and sunshine and shadow play with constantly changing effects, but they place another climate almost within arm's length.

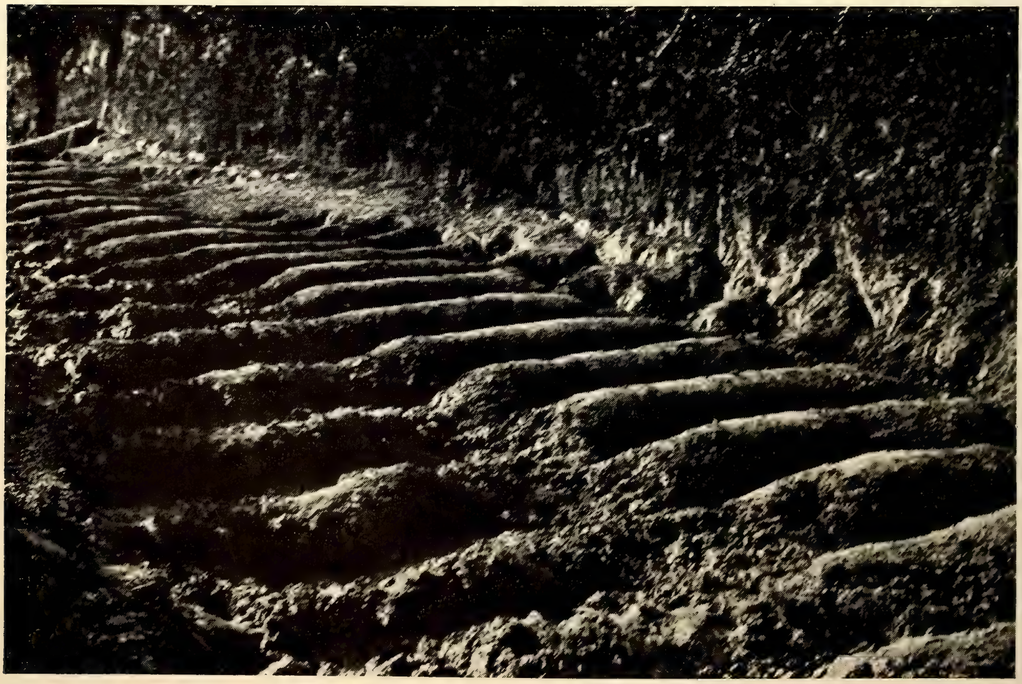
To be more specific, two or three hours in the saddle take one from the floor of the valley, in the Tropical Zone, to an elevation of 6,500 to 7,000 feet in the Subtropical Zone. At these altitudes the more well-to-do residents of the valley build attractive bungalows to which they repair for week-end visits or when they wish relief from the continuous, though not excessive, heat of their homes.

Two of these bungalows, one in the Western, the other in the Central Andes, were placed at our disposal by their owners and for several weeks they be-



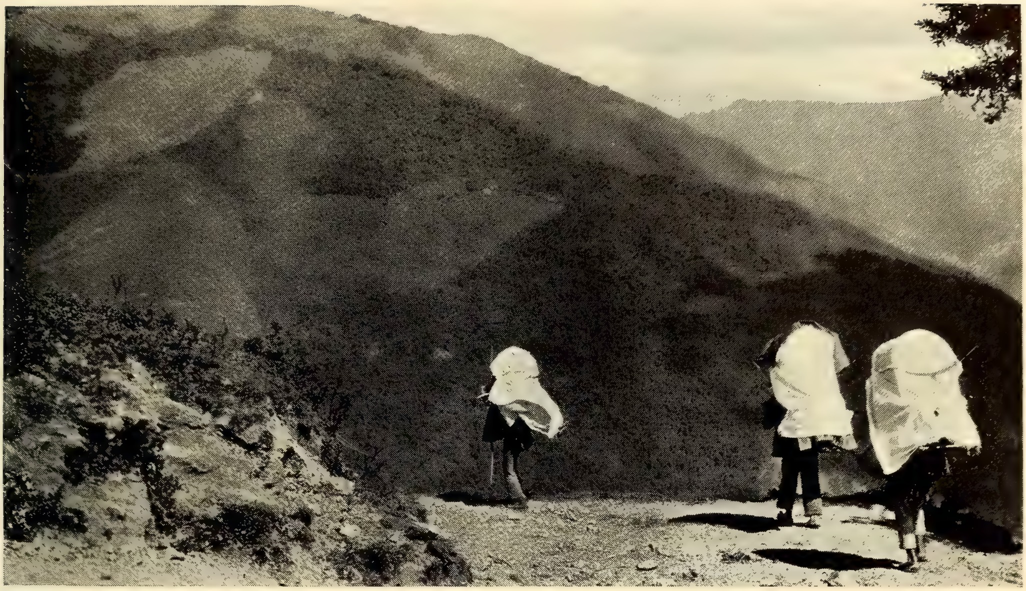
PERSUADING A DIFFIDENT TRAVELER ON AN ANDEAN ROAD

Louis Fuertes leads his horse through the ditches (*canjilones*) and over the ridges (*almohadillales*) of an Andean trail. Roads of this character are produced by trains of pack animals, each one of which steps in the track of its predecessor (see text, page 370).



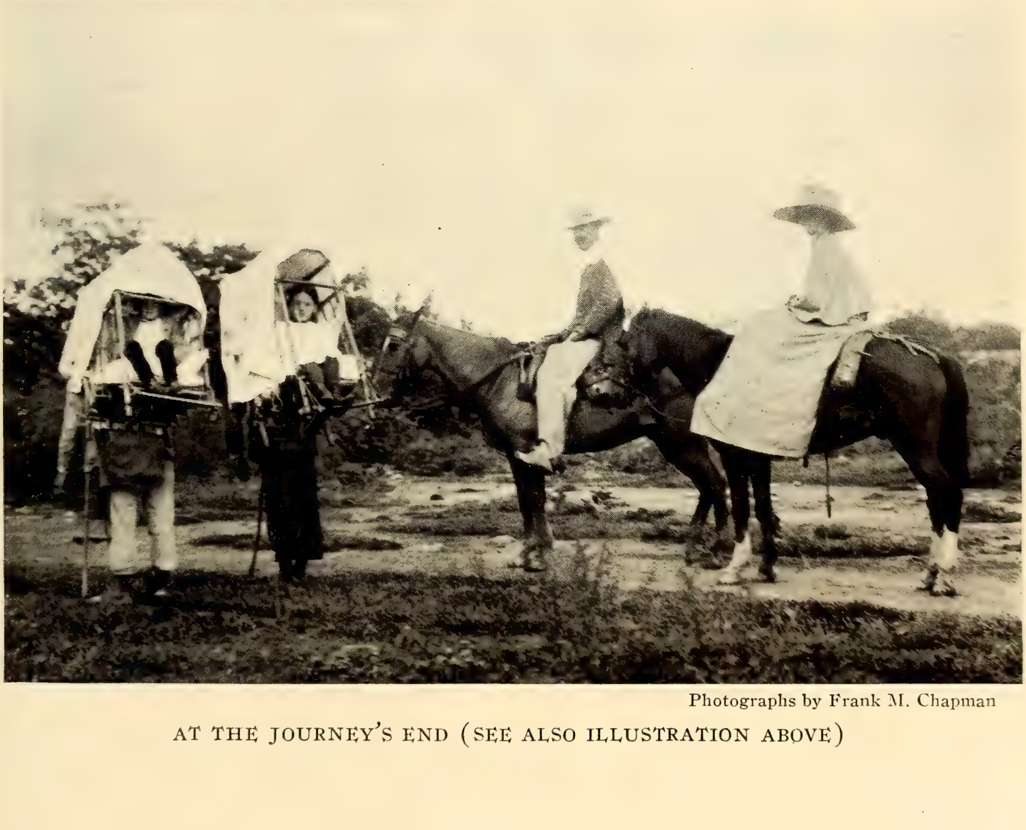
Photographs by Frank M. Chapman

THESE COLOMBIAN HIGHWAYS WILL NEVER BE POPULAR WITH AUTOMOBILISTS



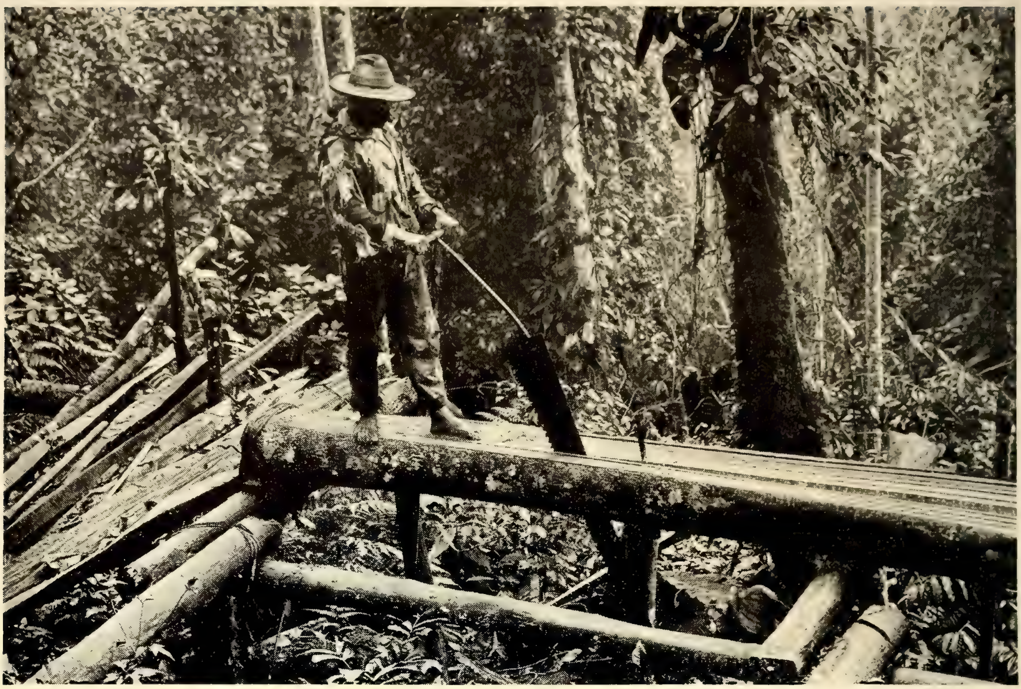
A MOTHER AND HER CHILDREN CROSSING THE ANDES IN CHAIRS

The chairs are lightly but strongly made, with a hoop, like the "bow" of a "prairie schooner's" top, above the seat, over which a sheet is thrown to protect the occupant Four bearers, or *silleros,* were required for the three chairs. For eight days they traveled at about the same rate of speed as pack-mules, or approximately three miles an hour.



Photographs by Frank M. Chapman

AT THE JOURNEY'S END (SEE ALSO ILLUSTRATION ABOVE)



Photograph by Frank M. Chapman

SAWING BOARDS BY HAND IN THE SUBTROPICAL ZONE OF THE CENTRAL ANDES

Two men—one above, the other below—work with mechanical precision. A dozen boards ten feet long, a foot wide, and not more than half an inch thick will be produced from the log pictured. They were designed for use in making boxes to hold one-pound bricks of sugar.

came our headquarters while we explored the surrounding forests.

Never were naturalists more comfortably situated. The temperature ranged from 60° to 70° daily; there were no flies, mosquitoes, or other troublesome insects; the grandeur and diversity of the scenery held us in a condition of exclamatory enthusiasm; and every day brought valuable additions to our collections.

Whether naturalist or painter, these quickly accessible subtropical mountain resorts form a distinctive and highly important feature of life in this favored region.

One is tempted to linger here indefinitely, but we are already far behind our schedule. These time-table itineraries are the bane of travel. They may be made with some reason for Cook's tours, but they are assuredly out of place in a country where the means of transportation are irregular, where time is rated far below par, and where the traveler will be tempted at every turn to depart from a prearranged plan.

The next stage in our journey, for example, may be made by steamer or by mule, but if one has a choice by all means take the former. I never recall my three days' voyage from Cali to Cartago without a desire to repeat it. The distance in an airline is about 100 miles, but by the river it is nearly twice as far and I wouldn't have shortened it an inch.

A TRIP DOWN THE CAUCA RIVER

The Cauca is a small, intimate river. From the steamer the details of both banks may be easily seen. The height of the water and rapidity of the current depend upon the amount of rain which has recently fallen in the area the river drains. At the time of our voyage in May the river was bank full and running about five miles an hour. To bring our flat-bottomed stern-wheeler to her not infrequent landings it was necessary to pass them, turn, and steam slowly up stream.

If the Cauca's serpentine course increased the length of our journey it also added greatly to its charm. Rapidly we wound through savannas with grazing herds and marshes with birds of many kinds, past cacao groves, with their sheltering *bois immortelles,* luxuriant growths of plantain, plumed cane, towering bamboos, and stretches of primeval forest.

The Central Andes, with their ever-changing clouds, rose grandly from across the valley, but the bare slopes of the western range were so near that in places the river laved their feet.

TROPICAL BIRDS MAY BE OBSERVED FROM STEAMER

The birds of a tropical forest are not easily observed, but from the steamer we had most satisfactory views of a large numbers of marsh- and savanna-inhabiting species. There were wood, white, and "cocleet" ibises, lapwings, jacanas and kingfishers, ducks of several kinds, including wild muscovies, and the rare Nation's duck, known from only two specimens until we rediscovered it near Cali.

Cormorants were nesting by hundreds in the upper limbs of the bamboos—a surprising situation—and giant black and yellow cassique orioles occupied their four-foot long nests swinging from branches high above the river. There were little gray herons and night herons, while hundreds of large white egrets dotted the savannas or, seen in distant flight, gleamed against the mountain-side like wandering snowflakes.

Pigeons and doves of several species, and green paroquets frequently passed overhead en route to roost or feeding ground, and a flock of roseate spoonbills so crowded the limbs of a leafless tree that it seemed to be a mass of pink blossoms.

Occasionally we passed, all too rapidly, a family of red howling monkeys asleep in the tree-tops or a capybara staring at us calmly from the shore.

If all the passengers on a Cauca River steamer are as attentive and cordial to strangers as those with whom we chanced to travel, we assert that the social features of life aboard ship form no small part of the attractions of a voyage on this beautiful river. Every one among the score of passengers seemed to know every one else, and within an hour after sailing Fuertes and I were included in a merry house-boat party.

With regret we bade *adios* to one after the other of our newly made friends as, donning *zamarras* or chaps, spurs and *ruana* or poncho, they mounted the horses waiting to take them to their estates. One family, however, a gentleman, his wife, and boy and girl of about six and eight years, accompanied us over the Central Andes. The children were carried all the way to the Magdalena River in chairs on men's backs. Their mother abandoned her chair only on the last day of the journey. Four bearers, or *silleros,* were required for the three chairs, and they traveled at about the speed of pack-mules, or approximately three miles an hour (see illustrations, page 367).

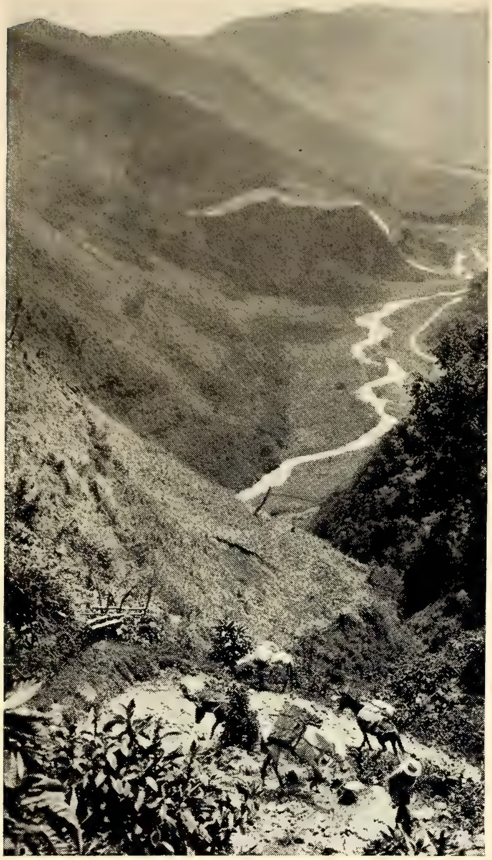
FOLLOWING THE QUINDIO TRAIL

Mules for the journey from Cartago to Girardot should be engaged before leaving Cali, when, if one arrives early in the morning, a start may be made the same day. Our stopping-places in crossing the Quindio depend upon the time we leave Cartago and the rate at which we travel. At the best they are rather primitive, and to one's sleeping outfit it is well to add a small supply of provisions.

It was 3 o'clock in the afternoon before we finally got under way, and we went only to Piedro Moller before putting up for the night. On successive nights thereafter we stopped at Filandia, Salento, Volcancito, El Pie de San Juan, El Eden, Ibagüe, and Chicoral, to the disgust of our arriero, taking eight days for a journey which can be made in four.

The Cauca Valley at Cartago is much wider than at Cali. For the first two days the way was up and down over low scrub-grown hills, and it was not until we reached the village of Filandia that we had our first view of the Central Andes. A fierce thunder-storm surrounded us by walls of rain and turned the plaza of the little town into a lake. At evening the clouds broke and the light of the setting sun warmed the distant forests, set the snows of Santa Isabel on fire, and crept up over the brown Páramo to rest at nightfall in a rosy glow on the dome of Tolima.

The real ascent of the range began at Salento, the last town we encountered until we reached Ibagüe at the eastern



Photograph by Frank M. Chapman

THE HEART OF THE CENTRAL ANDES: RIO TOCHÉ, FROM THE PASS OF SAN JUAN

The inn known as "El Pie de San Juan" (the foot of San Juan) lies near the Toché River where the trail of San Juan leaves the valley on the steep ascent up which the mules are struggling.

base of the range. We now had some conception of what Andean travel means and, in consequence of recent rains, had our first real experience with that peculiar type of road developed by pack animals. As a result of each beast's stepping in the tracks of its predecessor, wet places become a succession of ditches of varying depth and degrees of muddiness, separated by ridges. A man can cross such pieces of trail by stepping from ridge to ridge, and here the silleros were at an advantage. But horses, mules, or oxen must step in each ditch and drag their legs over the intervening ridge to the next ditch. It is slow and painful work for all concerned (see illustrations, page 366).

An hour above Salento we looked down upon the picturesque Quindio Valley, with its winding river and groves of palms, and up to the snows of Santa Isabel, a scene which strongly suggests Church's "Heart of the Andes."

The air soon became perceptibly cooler, there was a marked change in the character of the vegetation, birds of species we had never seen before became common, and at an elevation of about 9,500 feet we for the first time passed from the Subtropical to the Temperate Zone. We seemed suddenly to have entered a new world and were quite unprepared for the novelty of the experience.

The stunted, close-limbed, small-leaved forests of this zone extend to an elevation of about 12,000 feet, beyond which, and up to the lower level of snow, lies the bleak, open Páramo, constituting the fourth zone of Andean life and having, like those below it, a fauna of its own. It is evident, then, that these snow-capped mountains of the tropics have all the faunal elements one would encounter in traveling from the Equator to the poles.

To summarize: the Tropical Zone extends from sea-level to about 5,000 feet, the Subtropical from 5,000 to 9,000 feet, the Temperate from 9,000 to 12,000 feet, and the Páramo, or Alpine, from 12,000 to 15,000 feet, or snow-line.

Each zone has species of plants and animals which are restricted to it. For example, in that clearly defined stratum of life lying on Colombian mountainsides, between 5,000 and 9,000 feet, we found 230 species of birds which were not observed elsewhere. To determine the origin of these highly specialized faunas is the main object of our Andean researches.

The Pass of the Quindio, lying not far above the point at which we entered the Temperate Zone, has an elevation of 11,200 feet, and the trail, therefore, does not take us as high as the Páramo. We passed the night at Volcancito skinning birds collected on the way. It was too cold to sleep. Here, if not before, the traveler will discover why he has been carrying two pairs of double blankets.

The trail, following a route which existed long before Benalcázar crossed these mountains to make his surprising junction with Quesada and Federmann on the Savanna of Bogotá, descends into valleys and climbs the intervening spurs.

At times we crossed rippling streams half hidden by luxuriant vegetation; at others we had far-reaching views of superb mountain scenery, culminating in the surpassing picture of the Toché Valley from a forest of wax palms. It was on this trail, in 1801, that Humboldt discovered this stately tree which, with a height of from 180 to 200 feet, towers above any member of its family known to me.

THE HEART OF THE ANDES

The Toché Valley is in truth the Heart of the Andes and, whatever one's itinerary, it should include a night at the little inn known as El Pie de San Juan.

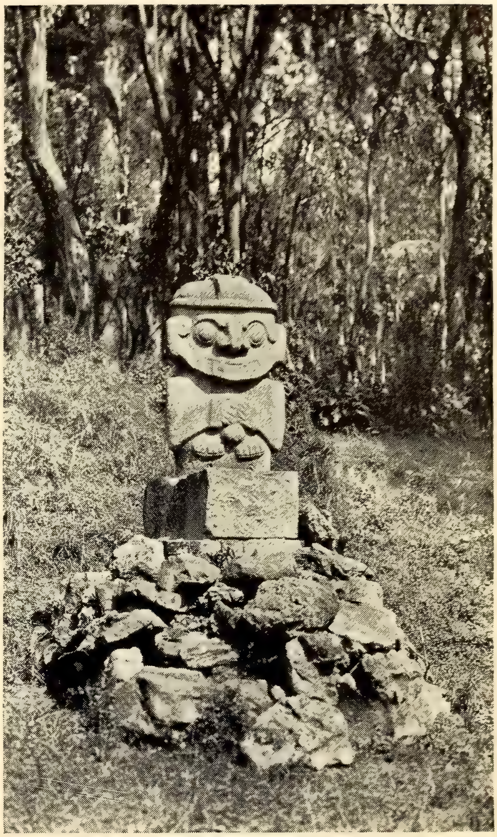
From this point one may reach Ibagüe in a day. I am told that the railroad from Girardot now connects this ancient city at the foot of the Central Andes with the Magdalena. If it does, our mule ride is over, for there is nothing on the hot plains of Tolima to warrant a longer stay in the saddle.

Girardot, with an elevation of 1,056 feet, is at the head of the larger steamship navigation on the Magdalena and the point of departure for the train for Bogotá. Possibly for the first time in Colombia we shall here be uncomfortably warm and will welcome an opportunity to reach higher altitudes.

Although only 82 miles long, the railroad makes an ascent of nearly 8,000 feet in reaching the tableland, and the better part of the day is required for the journey. At Facatativá we change cars for the run of 25 miles over the level savanna to Colombia's capital.

BOGOTÁ A CITY OF STRONG CONTRASTS

What the Cauca Valley is to tropical Colombia, the Savanna of Bogotá is to that part of the country lying in the Temperate Zone. The elevation is about 8,700 feet, the mean temperature is about 60°; there is a fair rainfall, the ground is productive and, where not devoted to grazing, the whole savanna is given over to the cultivation of corn, cereals, and potatoes. Streams and ponds, and, in the rainy season, lakes, furnish a home for water-fowl some of which are resident all the year, while others come from North America for the winter.



Photograph by Frank M. Chapman

A PREHISTORIC STONE IMAGE FROM SAN AGUSTIN, IN THE PARK OF BOGOTÁ

San Agustin, at the head of the Magdalena Valley, was the site of a culture, neither Incan nor Chibchan, about which comparatively little is known. Heroic figures of this kind have been found in numbers there. Two of them were transplanted to Bogotá under the direction of former President Reyes.

A naturalist has neither time nor inclination for a study of city life. Certainly I do not feel qualified to write of the characteristics of Bogotá, and with a suggestion or two I will leave the traveler to make his own investigations.

Bogotá is our first city in the Temperate Zone, and we will note the almost entire absence of the negroid element which forms a large part of the population of lower altitudes. In its place we shall find the sturdy, ruddy-complexioned descendants of the Chibcha type, indigenous to this region.

Bogotá is a city of strong contrasts—a fact which will impress us if we go from the market-place, swarming with natives,

Photograph by Frank M. Chapman

FOLIAGE THAT WELL DESERVES ITS NAME

A luxuriant growth of "elephants' ears" in the Subtropical Zone of the Western Andes at an altitude of 6,500 feet.

to the streets of the financial section of the town, no less thickly peopled with white men in frock coats and high hats, who, in default of a warmer place, meet here to discuss the affairs of the day.

Bogotá is a well-ordered, superficially at least, clean city with a large and efficient police force, with an opera-house, metropolitan in appearance, with polo, foot-ball, and tennis clubs, museums, a national library of 60,000 volumes, a charming social and a highly developed intellectual life.

THE OLD MULE TRAIL FROM BOGOTÁ TO HONDA

The traveler may spend much time profitably and pleasantly at Bogotá, and when he tires of the city he may make excursions to the haciendas on the savanna, to the Falls of Tequendama, or the *cafetales* (coffee plantations) of Fusagasugá. These journeys may be made in part by train, in part by horseback. Cars for horses are attached to all passenger trains, and when buying a ticket for himself the traveler buys one for his horse, the charge being alike for both.

Prior to the completion of the railroad to Girardot, in 1909 Bogotá was connected with navigation on the Magdalena by the mule trail to Honda, a fact which should always be remembered as one considers the city's growth in relation to its remoteness. This route is still used for freight, the mule proving an effective if humble competitor of the locomotive, and I strongly urge the traveler to follow it when returning to the Magdalena. The country traversed is far more interesting than that through which the railway passes, and history and tradition hang thick about the trail and the posadas.

Above all, from the heights between Guaduas and El Consuelo, known as "El Alto de Sargento," there is a view across the Magdalena Valley of the Central Andes with the snowfields of Ruiz and Santa Isabel and cone of Tolima, which is worth coming to Colombia to see. In composition, modeling, color, and grandeur it cannot, in my experience, be matched by any mountain panorama in the Western Hemisphere.

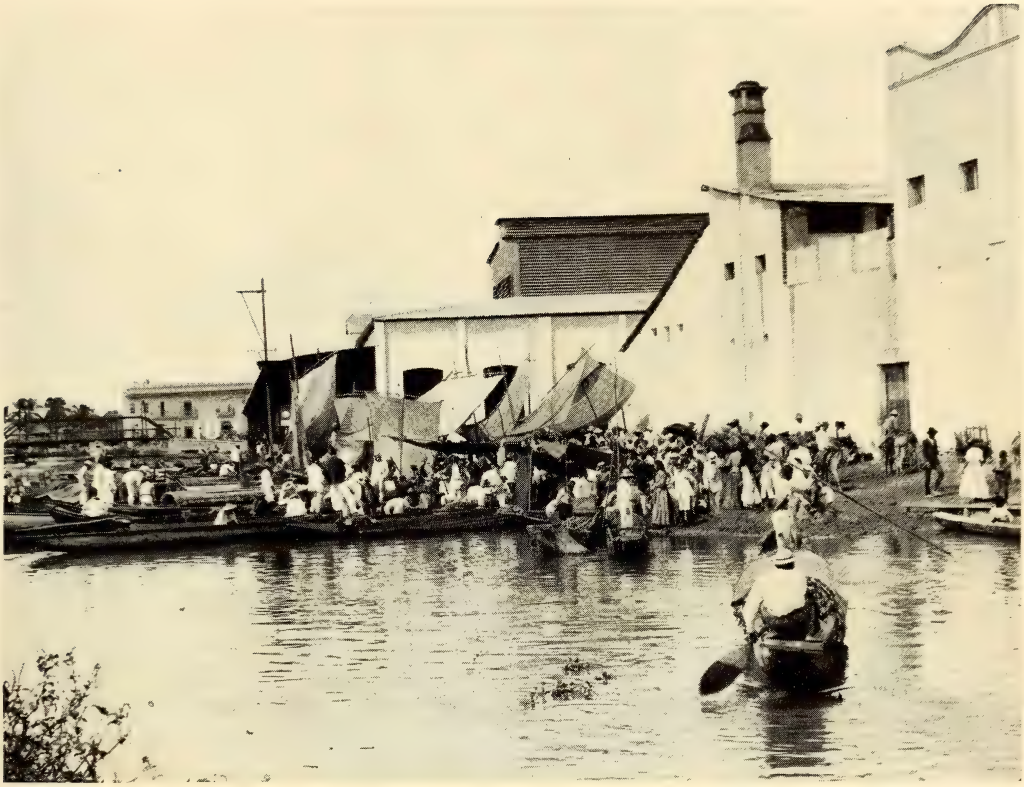
Some day I hope to return to the little inn of El Consuelo to watch, morning after morning, the sublime spectacle of the sun illuminating the snow crests of the Central Andes, revealing the deep seams on their rugged slopes, and stealing slowly out in the valley at their base until it turns the winding Magdalena into burnished silver. Certainly the traveler should plan to spend at least one night at El Consuelo, and when the daily miracle of sunrise is over, he may continue his journey to Honda.

A VOYAGE DOWN THE MAGDALENA

Honda is a hot town and will seem doubly so after the cool, invigorating air of the tableland. It is a relief to board the train for the 18-mile run to La Dorada, where we embark on the steamer for Barranquilla. Once under way, current and stream combined give us a speed of 10 to 12 miles an hour and a grateful breeze sweeps through the boat.

The voyage down the Magdalena was an enlarged edition of our cruise on the Cauca. The river is broader, varying from a quarter of a mile to half a mile in width; the steamer was more spacious.

The fauna of the shores and playas was more varied, the passengers more numer-



Photograph by Frank M. Chapman

THE WATER APPROACH TO THE MARKET IN BARRANQUILLA

A canal from the Rio Magdalena gives access to the large, well-stocked market of Barranquilla. Most of the provisions, fruits, vegetables, fish, etc., are brought in native canoes, a means of transportation which adds greatly to the picturesqueness of the waterfront and suggests the approach to the market-place of Tampico, Mexico.

ous and representing widely different callings. There was an archbishop and a bull-fighter who shared the same bottle; a music-loving priest and a guitar-playing rake who found community of interest in song; a Colombian general, an English engineer, and an American promoter, all strongly marked types, with enough minor characters to stage the play.

FAUNA OF THE MAGDALENA'S SHORES

A variety of circumstances have made the Amazon best known of tropical American rivers, but from the traveler's standpoint a voyage on the Magdalena is infinitely more interesting. From an Amazon steamer the river's banks may be but a thin line on the horizon, if, indeed, they are visible at all, but on the Magdalena one or both shores are within range of the unaided eye, and with glasses one can often see intimate details of forest life.

There are monkeys, sloths, macaws, parrots, pigeons, toucans, and many other wood-loving creatures; herons, screamers, jacanas, and jabiru storks in the marshes, capybaras on the shores, and rafts of crocodiles on the playas.

The four days' voyage to Barranquilla passed so quickly and pleasantly that when next I returned to the city I took passage on a boat which required twelve days for the trip to Honda. Arrived at Barranquilla, we are again within touch of ocean-going steamers and our Colombian tour is ended.

In conclusion, let me say that no one can be more conscious than I of my failure to draw an adequate picture of Colombia's attractions, but at least I may claim the merit of under, rather than over, stating them.

THE SOCIETY'S NEW MAP OF SOUTH AMERICA

The map of South America that accompanies this issue of the NATIONAL GEOGRAPHIC MAGAZINE portrays a continent which has many characteristics peculiar to itself.

It is the most southerly of all the continents. Where Africa reaches to approximately 36° south latitude and Australia to 38°, South America stretches into the austral seas until Cape Horn touches 56° south latitude. In other words, South America extends some 1,200 miles nearer to the South Pole than any other continent.

This continent has twice the area of Europe, yet it has less than two-thirds the combined population of France and Italy. Twice as large as the United States, including Alaska, it has a population only a little more than half as great. In general outline it is not unlike Africa, but it is more symmetrical than the Dark Continent.

The three continents of the Southern Hemisphere are similar in their unindented coast-lines, and the headlands of Brazil seem to reach out as if to join hands across the sea with the corresponding headlands of Guinea.

The vast basins of the Amazon, the Rio de la Plata, and the Orinoco are in many parts so low-lying as to be swampy, and in spite of the tremendous amount of water they carry off, the currents are sluggish; yet so towering and so extensive are the Andes Mountains that if all the highlands were plowed down and all the lowlands were filled up, the continent would be a plateau 1,312 feet above sea-level, and 820 feet of this would be represented by the material that constitutes the Andes.

RIVERS OF NORTH AND SOUTH MINGLE AT THEIR SOURCES

South America is distinguished among all the continents for the absence of clearly defined watersheds between its great river basins. From the Orinoco delta to the Rio de la Plata estuary there is almost a continuous overlapping of these basins. In southern Venezuela, where that country thrusts a political peninsula into northern Brazil, below the town of Esmeralda, the waters of the upper Orinoco suddenly decide to part company, some of them reaching the Amazon and the sea through the Brazos Casiquiare and the others forcing their way to the lower Orinoco over the rapids of the eroded mountain barriers at Maipures and Atures.

Although the communications between the Amazon and the Rio de la Plata basins are not so marked as those between the Amazon and the Orinoco basins, there are numerous places where the flip of a bird's wing, the direction of the wind, the abundance of local rains, the formation of a sand-bar, or the slip of a bit of land may determine the destiny of a drop of water, whether it shall flow past Pará or Buenos Aires. At the foot of the Bolivian highlands of Santa Cruz Province various branches of the Amazon-feeding Mamoré and the Rio de la Plata-feeding Pilcomayo seem rivals in their bid for territory to drain.

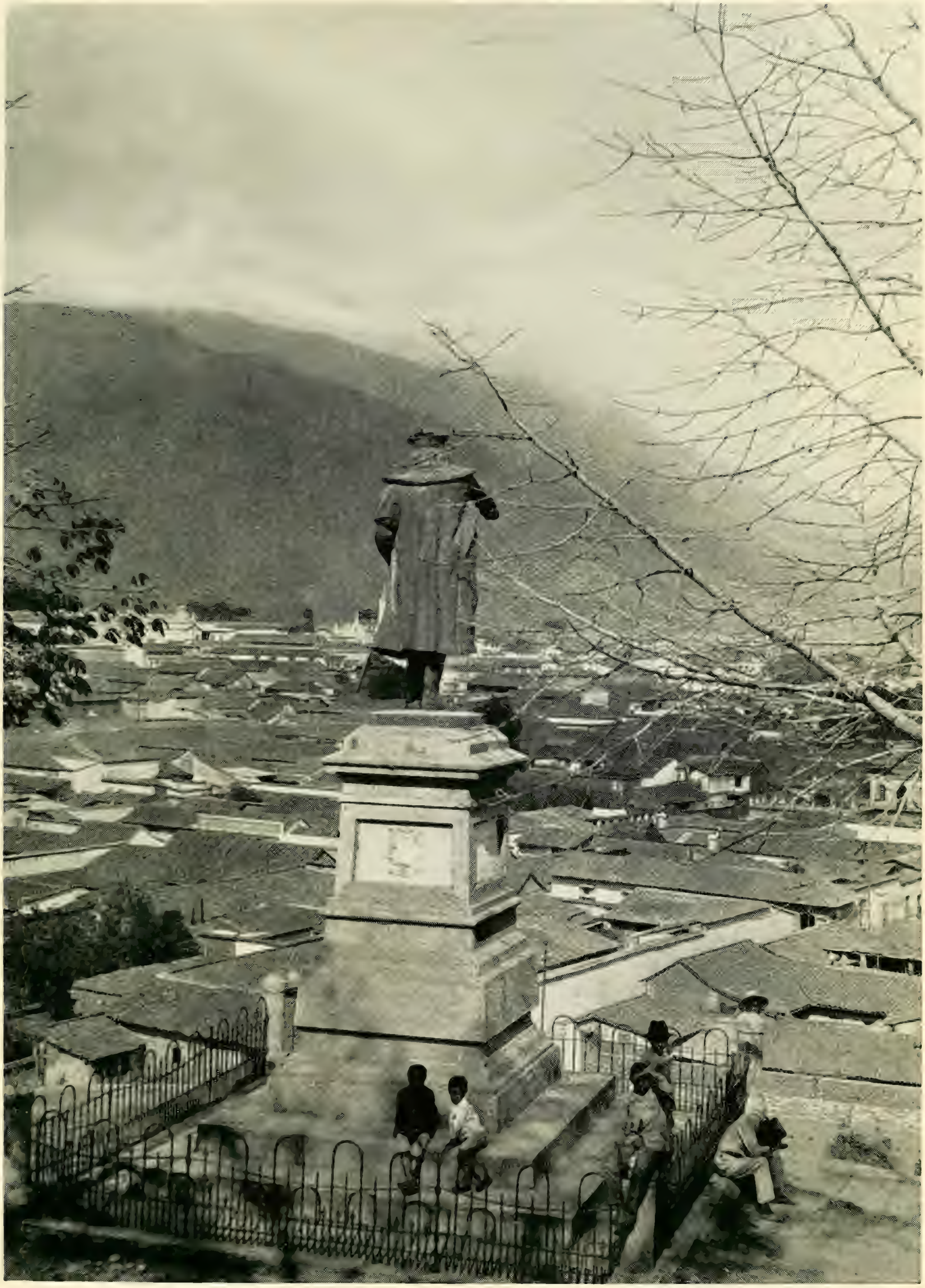
In Oriente Province, Bolivia, the San Miguel, which reaches the sea through the Amazon, after stealing around the Continental Divide in the Serra Aguapehy Hills, seems bent on capturing the waters that belong to the Rio de la Plata's tributary, the Otuquis.

FROM HUDSON BAY TO GULF OF MEXICO IF MISSISSIPPI WERE AMAZON

Further to the northeast, in Matto Grosso Province, Brazil, the Paraguay River returns the compliment of the San Miguel by breaking through between the Serra Azul and the Serra do Tombador into the drainage basin of the headwaters of the Arinos branch of the Tapajóz, a tributary of the Amazon. Two attempts have been made to join these two rivers by a canal—in 1713 and 1845.

In several places, canals five miles long would give free communication by inland waterways between Pará and Buenos Aires.

The great length of the navigable reaches of the principal rivers of South America and their major tributaries more than compensate for the lack of indented coast-lines. The Missssippi, "Father of Waters," and its tributaries, have seventeen thousand miles of navigable waters, the major portion exceedingly shallow. The Amazon and its tributaries have



Photograph by Frederick I. Monsen

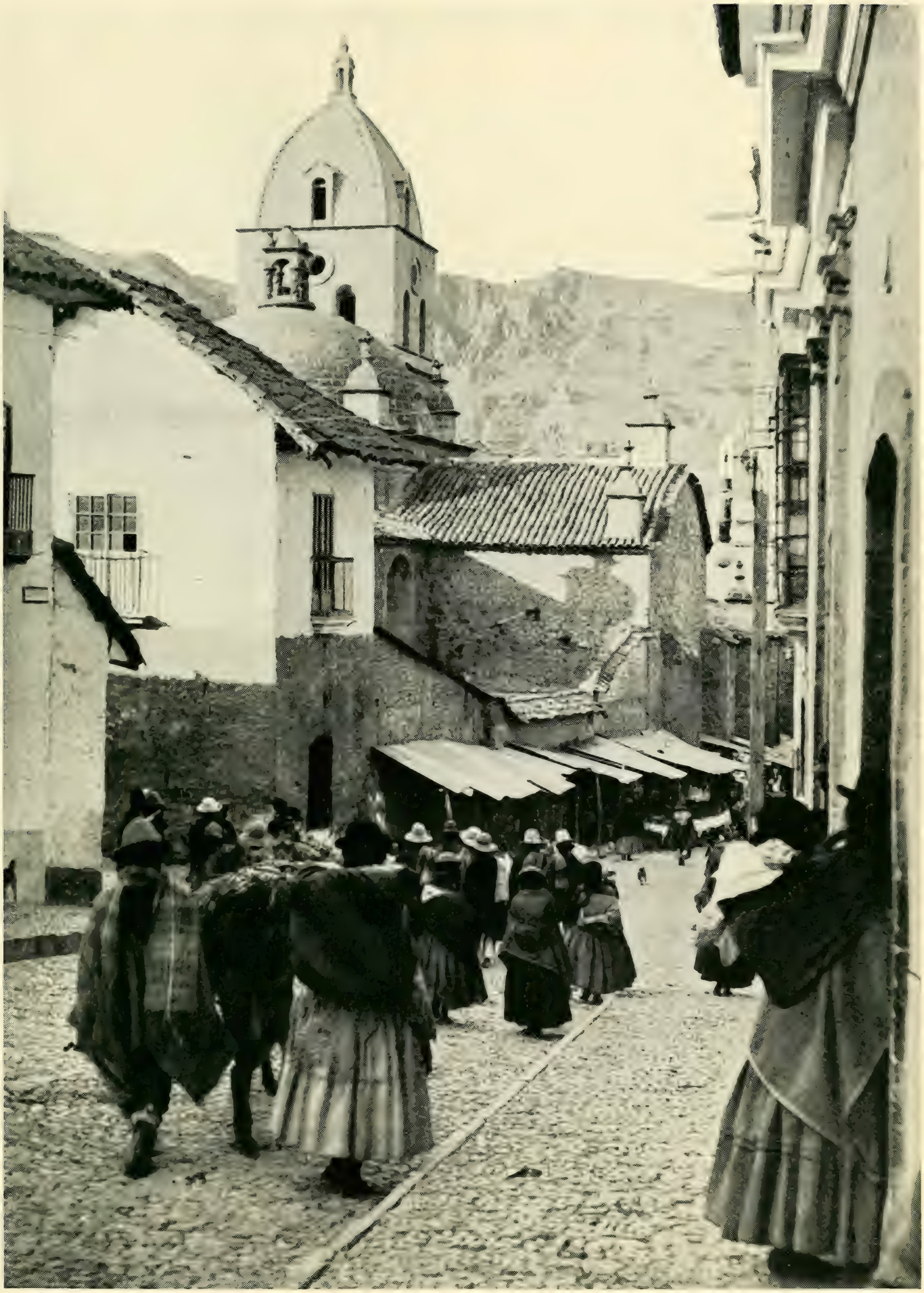
COLUMBUS IN BRONZE OVERLOOKING CARACAS, VENEZUELA'S CAPITAL OF PERPETUAL SPRING

Situated in a fertile valley 3,000 feet above sea-level is the city of the nativity of Simon Bolivar, the great Liberator of South America. It lies six miles south of Venezuela's principal seaport, La Guaira, with which it is connected by a railroad that winds upward from the shore by a serpentine route twenty-four miles long.

© Underwood and Underwood

A ROMEO-AND-JULIET BALCONY SCENE IN BARRANQUILLA, COLOMBIA

But life is not all romance in this city near the mouth of the Magdalena River. It is the principal commercial center of the Republic of Colombia and the starting point for the nine-day trip, by stern-wheel steamer of the Mississippi River type, to La Dorada, 600 miles up the Magdalena, where the traveler transfers to a train for a 20-mile ride, then changes to mountain mules for the final lap of his journey, through magnificent Andean scenery, to the inland capital of Bogotá.



Photograph by K. V. Gizycki

INDIANS BRINGING THEIR PRODUCE TO THE MARKET OF LA PAZ: BOLIVIA

Few cities in the world can rival La Paz in beauty and grandeur of setting. Although situated at an elevation of nearly two and a half miles above sea-level, it is surrounded by a vast amphitheater of still loftier mountains. The grades of the city are so steep that many of the burdens are borne by mules, donkeys, llamas, and Indians.

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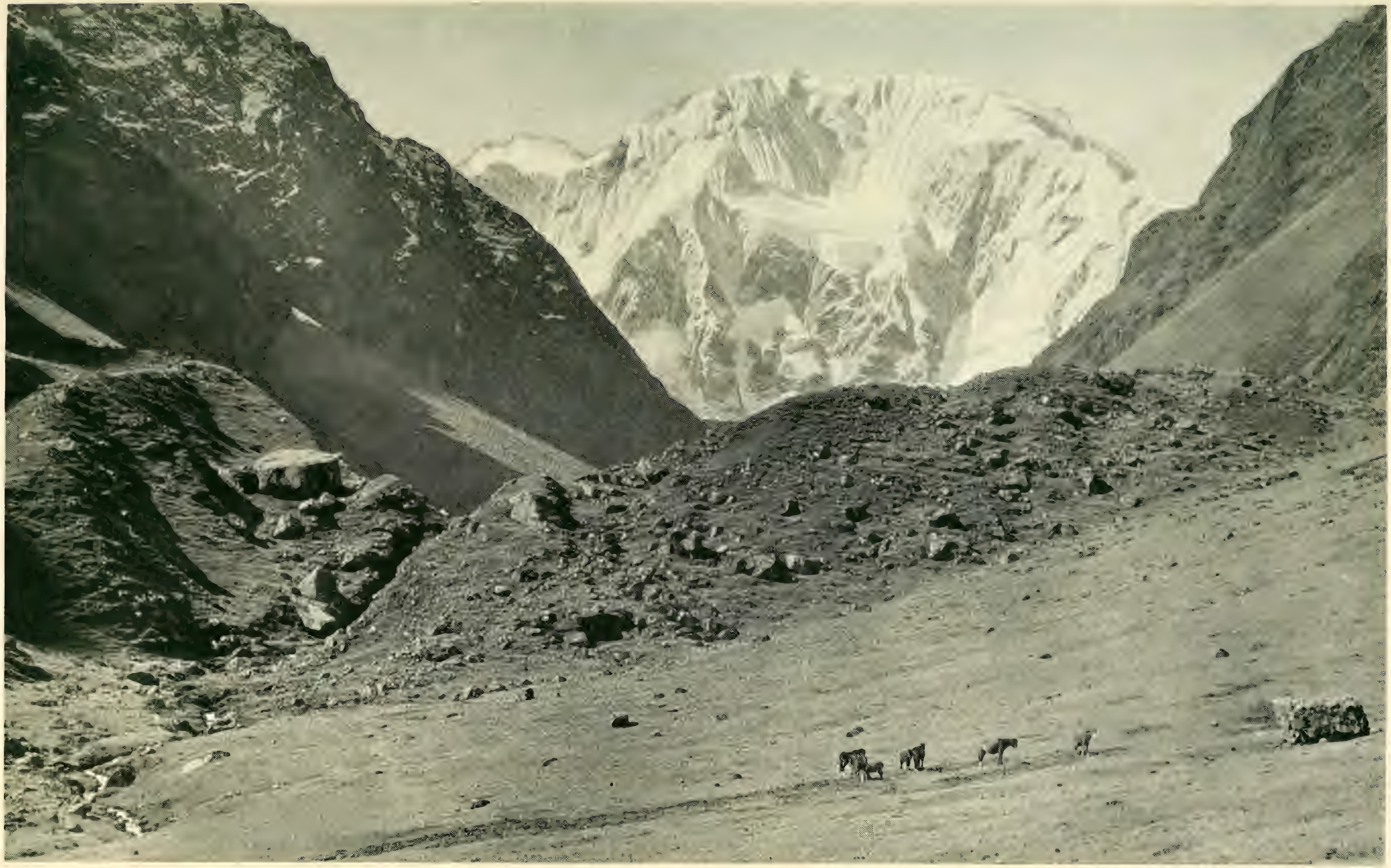
STUDYING THE LAND OF THE INCAS FROM THE DECK OF A PASSING STEAMER: A GLIMPSE OF MOLLENDO, CHIEF SEAPORT OF SOUTHERN PERU

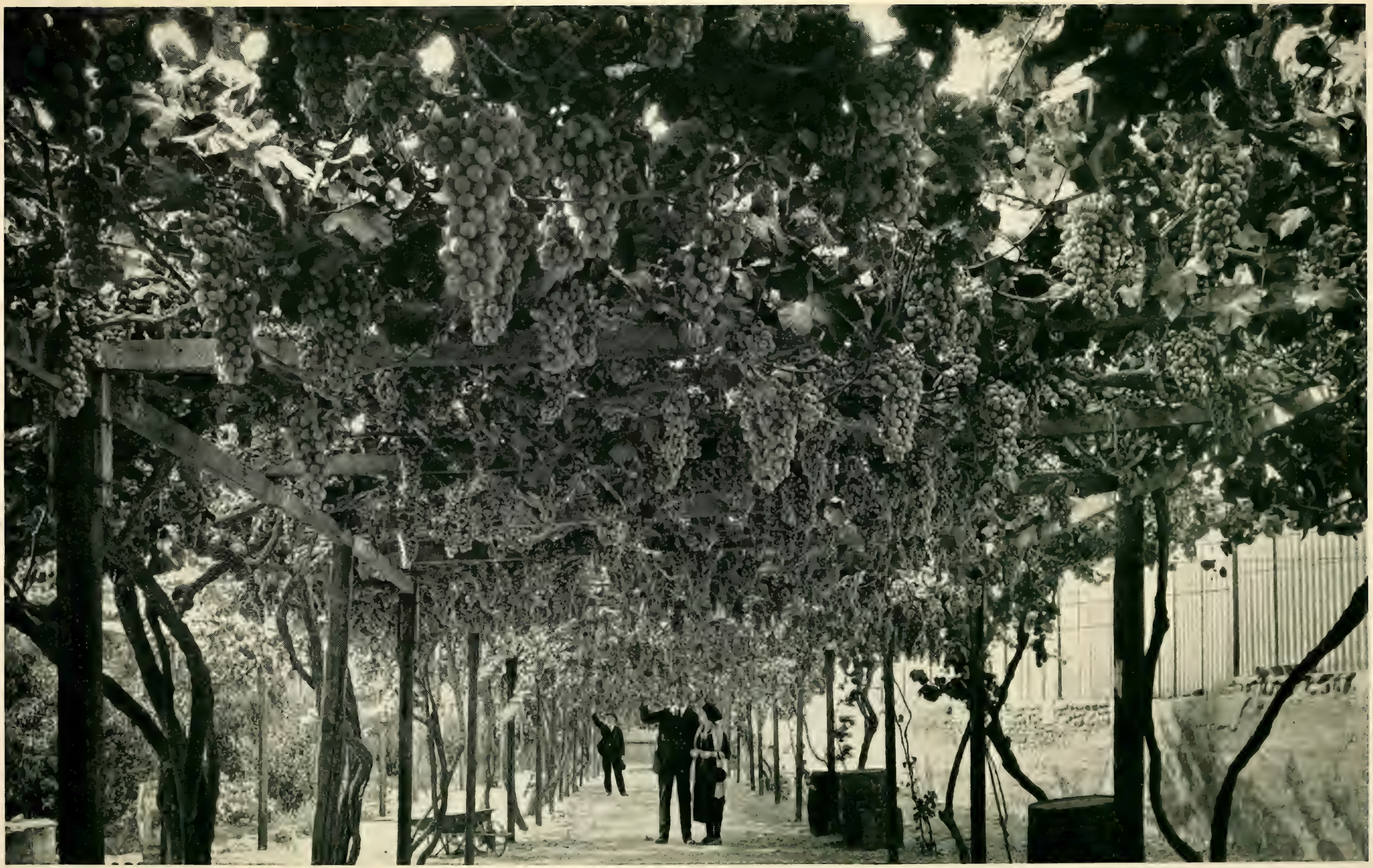
Spread out at the base of a hill, with its varihued houses glistening in the sun, Mollendo presents an attractive appearance at a distance; but it is not an ideal port, for passengers are landed through the surf in native rowboats. As the city is a railway outlet not only for southern Peru, but also for northern and central Bolivia, it has the distinction of a "double-jointed" custom-house, first for imports into Peru and second for those which are to be carried through Peruvian territory to Bolivia.



Photograph by Albert H. Bumstead

MT. SALCANTAY, AN ANDEAN JUNGFRAU

This majestic peak, in central Peru, standing guard over Machu Picchu, the Lost City of the Incas, is nearly a mile and a half higher than the famous "Virgin Mountain" of the Alps, however. The rocks in the foreground mark the former position of the foot of a glacier which comes down from the mountain and now terminates a mile up the valley.



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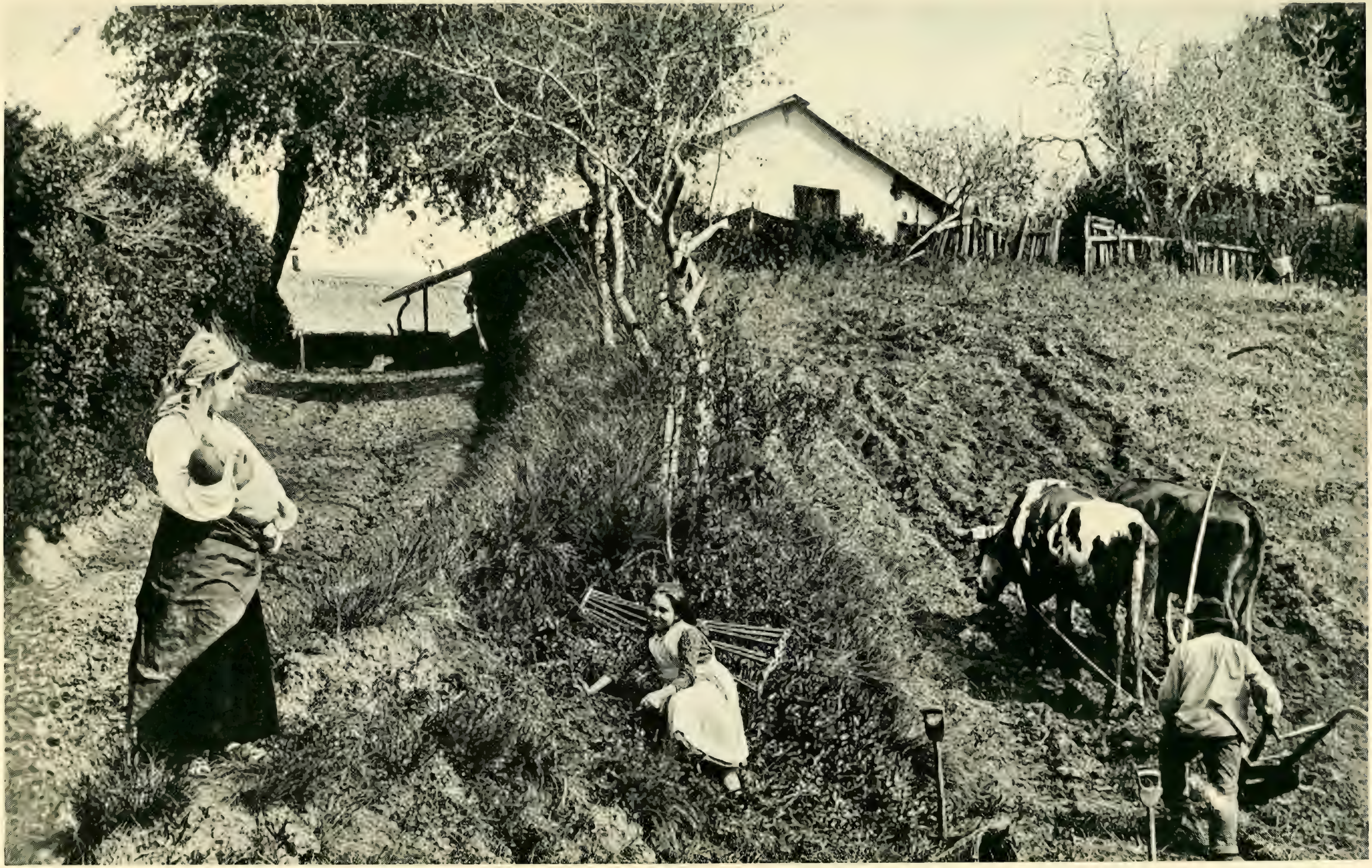
GRAPES OF TACNA, NORTHERN CHILE

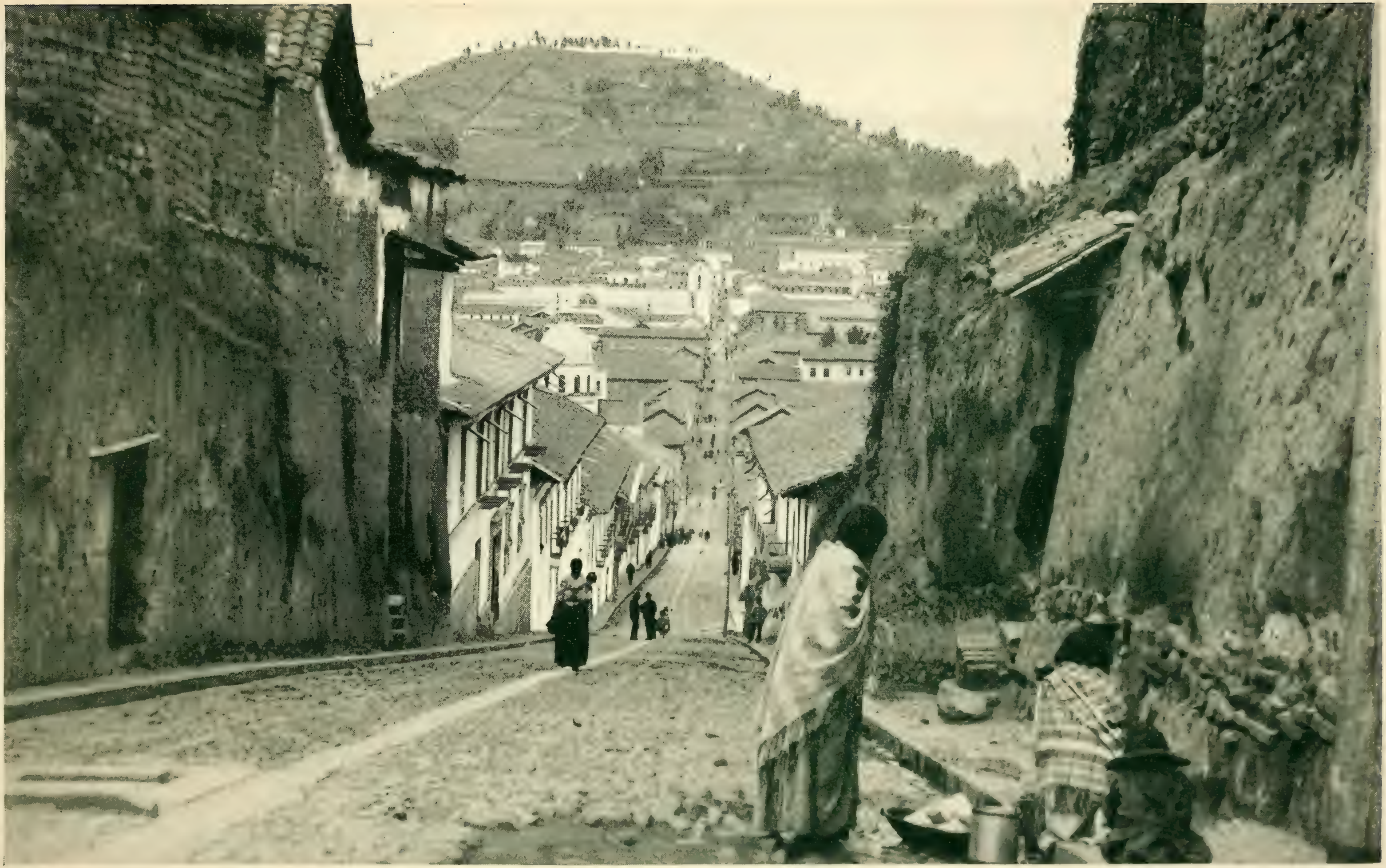
In the heart of a fertile Andean valley nestles the little city of Tacna, capital of the province of the same name and connected by rail with its seaport, Arica, forty miles distant. Here the Chileans won a victory over the Peruvians in 1880, and four years later the vanquished nation ceded the province of Tacna to the victors for a period of ten years, at the end of which time there was to have been a plebiscite, but the plebiscite has never been settled. Hence South America's "Silesia."



Photograph from Publishers' Photo Service

FARM LIFE IN CENTRAL CHILE

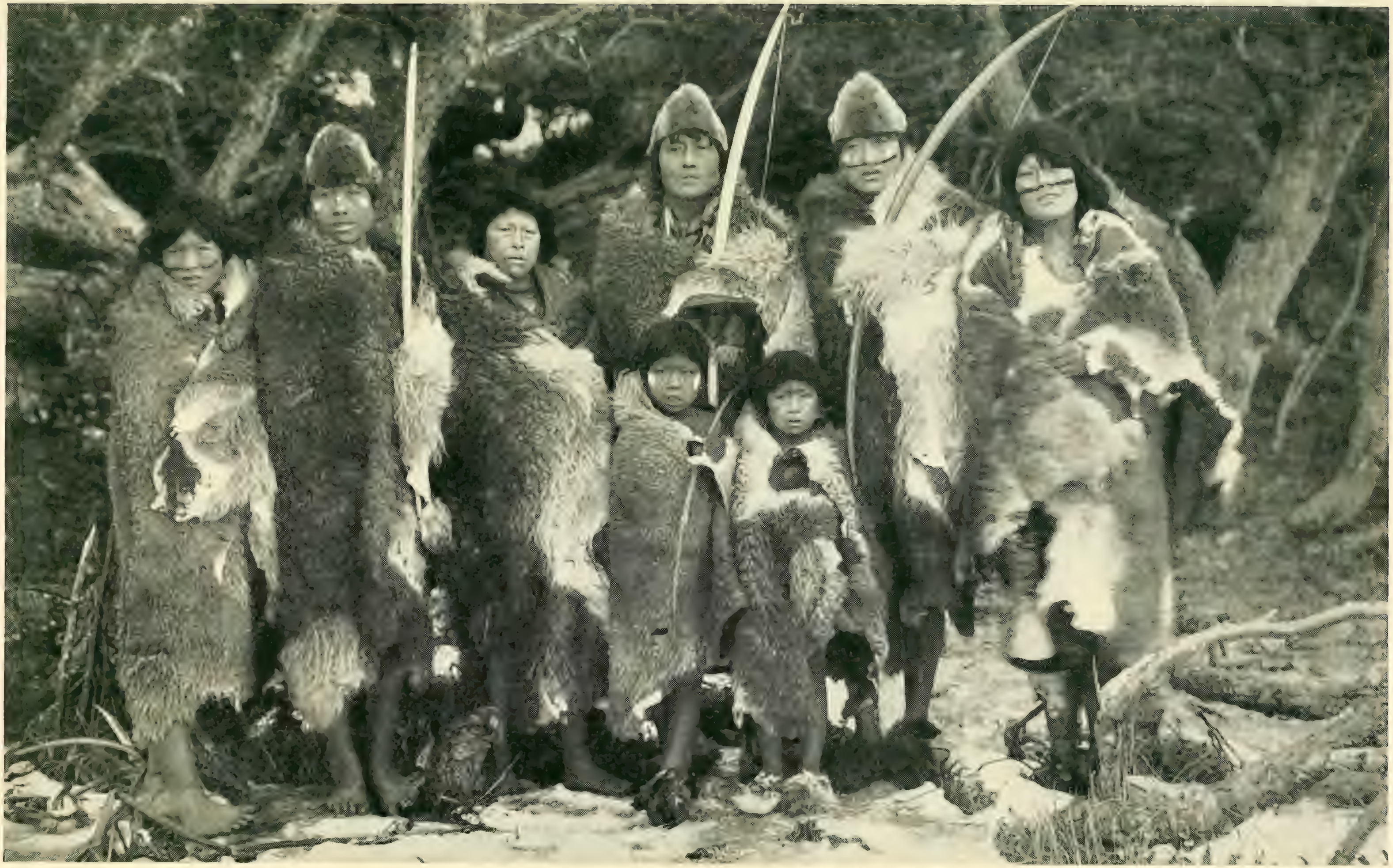
The fame of Chile's nitrate mines, in the arid zone of the north, has caused the outside world to lose sight of this country's splendid resources in field and forest, yet nearly one-half the population is engaged in agricultural pursuits, the principal crops being wheat, barley, maize, beans, potatoes, and grapes.



Photograph by Richard B. Hoit

ECUADOR IS JUSTLY PROUD OF ITS UNIQUE CAPITAL, QUITO

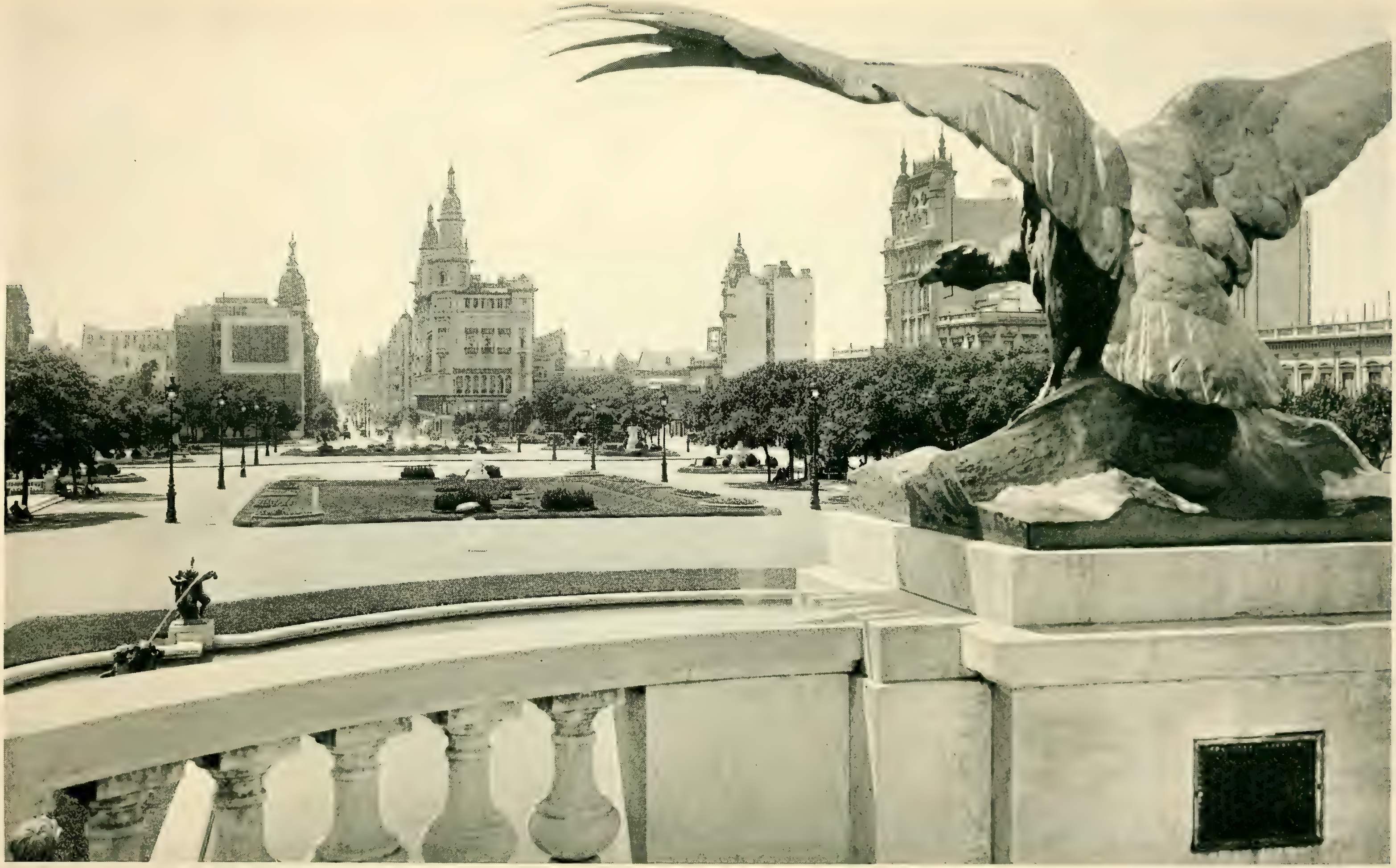
Although "perched upon the Equator," the city enjoys a most salubrious climate, for there are only a few capitals in the world which have so great an elevation—more than 9,000 feet above sea-level. The Indians are the chief burden-bearers of Ecuador, and the flat stones laid in the center of the street constitute their runway.



Photograph from F. Lamson Scribner

FUR-CLAD INDIANS OF SOUTHERN ARGENTINA

Magellan, the circumnavigator, described Patagonia, the home of these people, as a land "stark with eternal cold," and other travelers have called it the "Siberia of South America"; but, like Siberia, it is capable of great development. The splendid specimens of mankind shown above suggest the origin of the name, Patagonians—giants with big feet. Tradition says that members of one of the maritime tribes of this region make a practice of throwing their women overboard to lighten their canoes in a storm.



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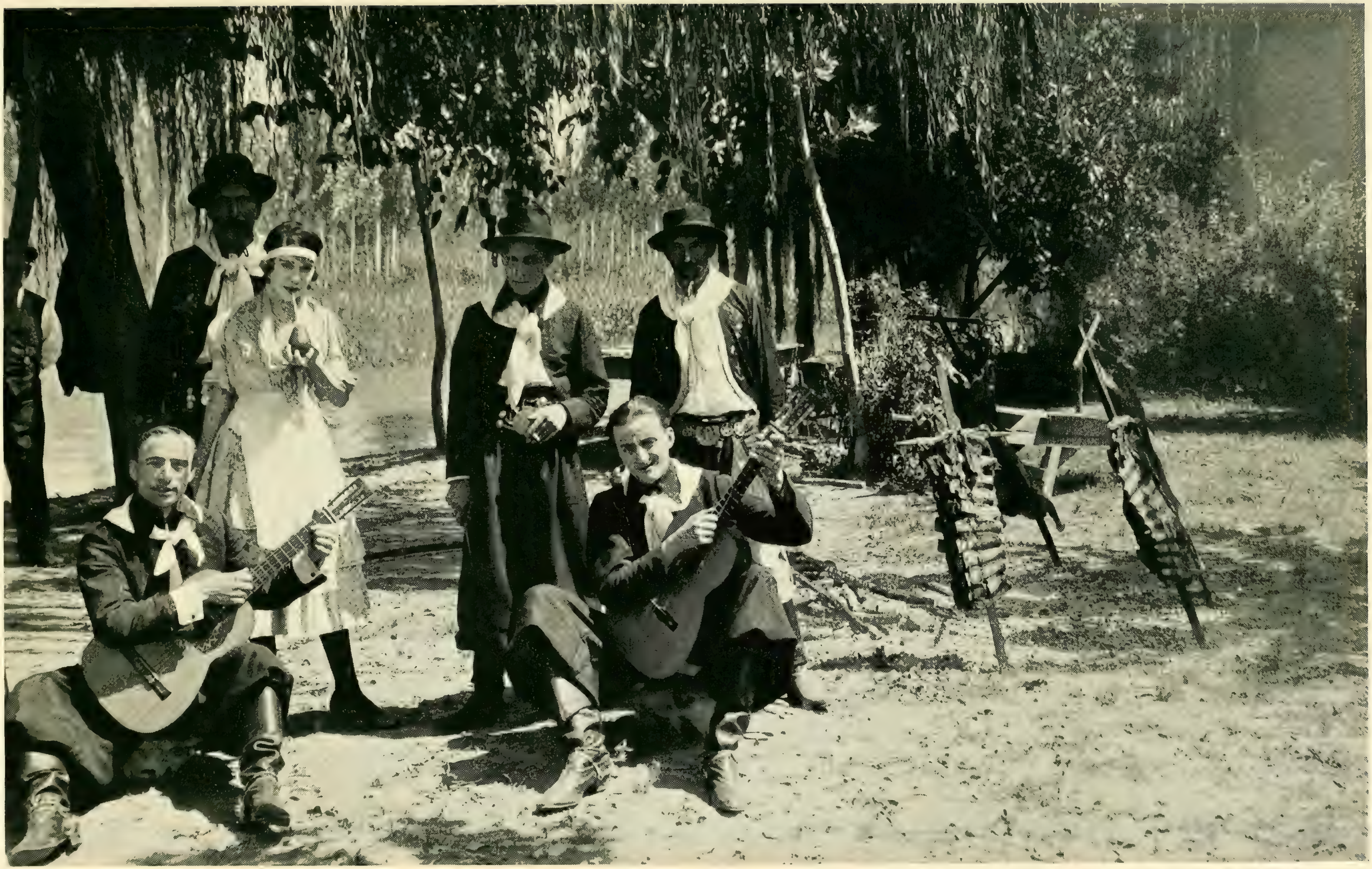
THE SQUARE AND MONUMENT IN BUENOS AIRES WHICH COMMEMORATE THE INDEPENDENCE OF ARGENTINA

In 1910 the Argentine Republic celebrated the centennial of the Revolution de Mayo, by which the people renounced allegiance to Spain. Many countries presented the republic with commemorative statuary symbolic of the occasion, the gift of the United States being a life-size bronze figure of George Washington.



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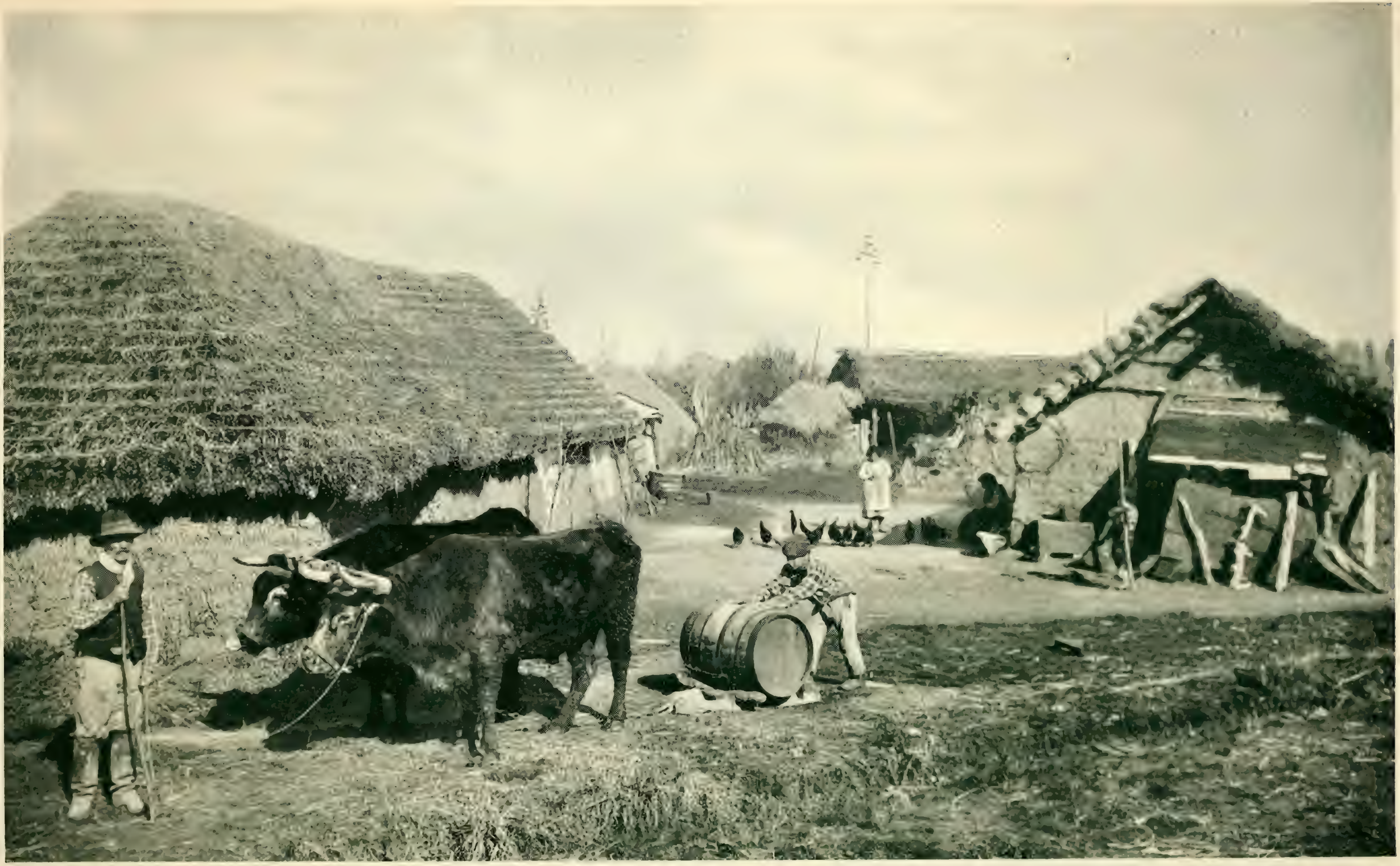
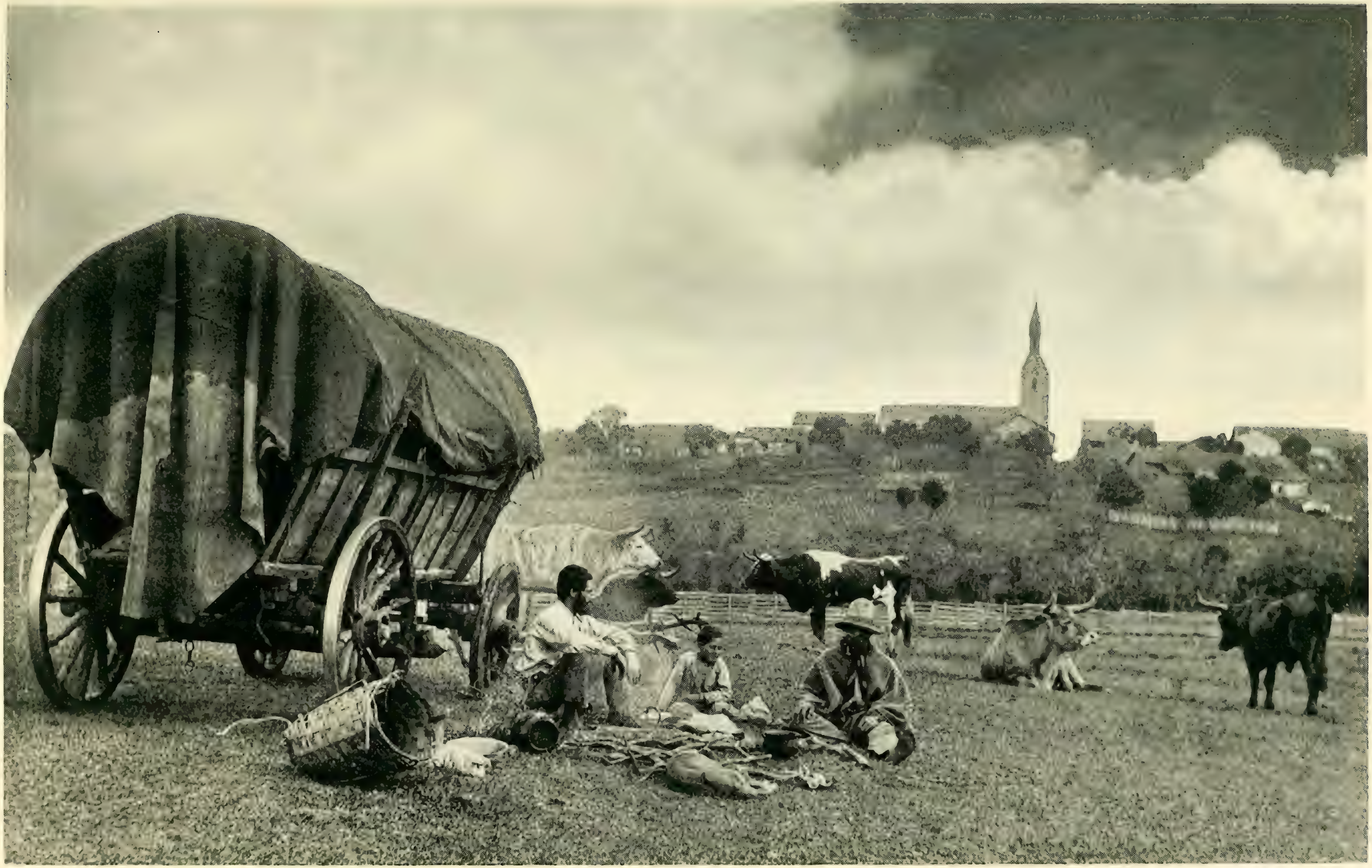
MOST ARGENTINE GAUCHOS PLAY THE GUITAR AND IMPROVISE WORDS FOR POPULAR AIRS

The young lady in the audience is sipping her maté, the popular Paraguay tea. Distinguishing features of the costume of the gaucho, or South American cowboy, are the wide, often brightly colored Turkish trousers, tucked into the boots, sombrero, white shirt, and scarf. At the right are asados—sides of mutton speared by metal shafts and stuck into the ground. A fire is built around, and while the roasting proceeds claret wine is poured over the meat. This form of barbecue is very popular in South America.



A RANCHER'S FARM IN PROSPEROUS URUGUAY

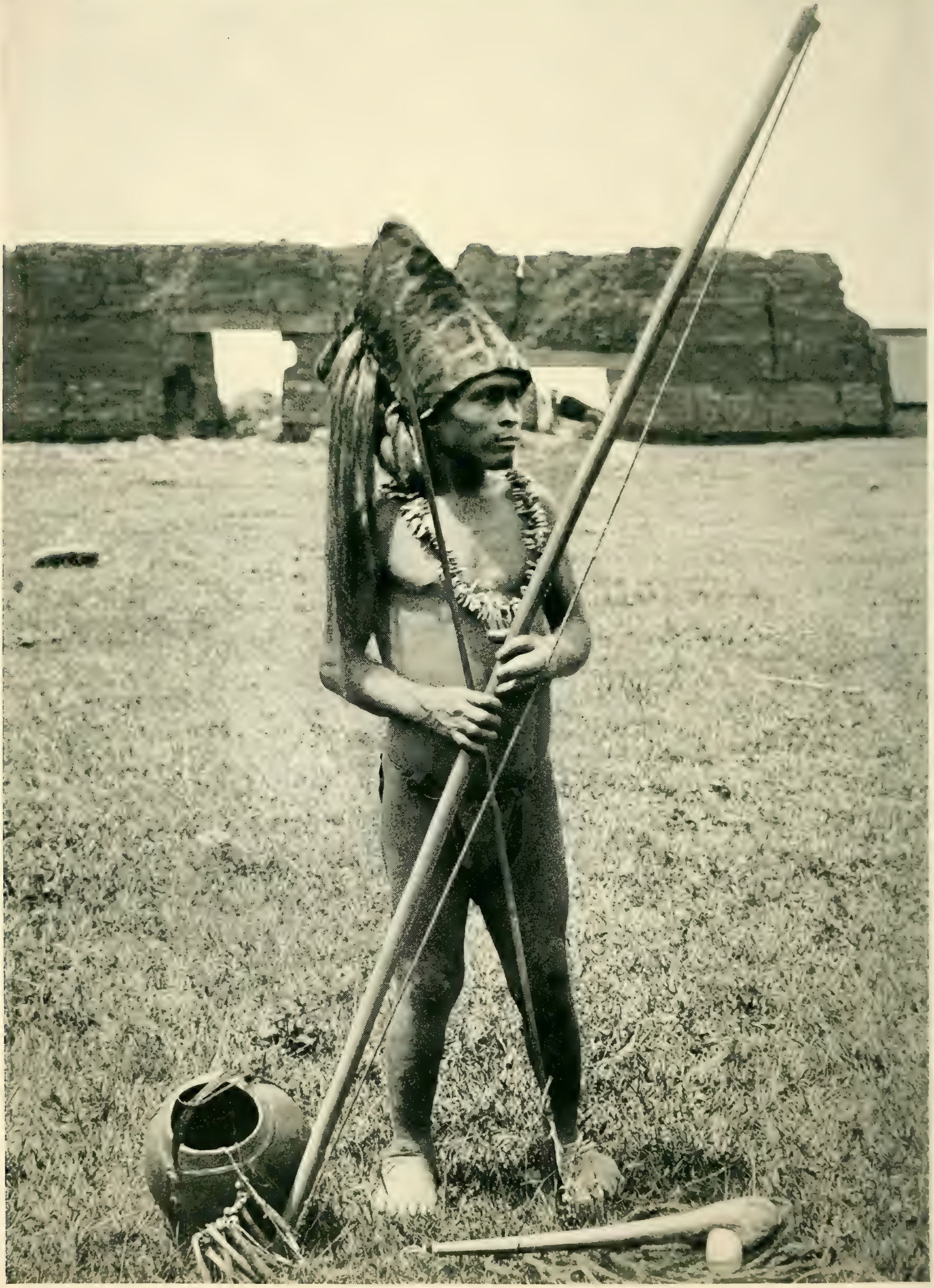
Although the smallest of the South American republics, Uruguay is one of the wealthiest and most progressive. It is a vast pasture, unmarred by deserts, mountains, or barren lands, upon which graze millions of cattle and sheep. Montevideo, the capital, with a population equal to pre-war Washington, is one of the healthiest communities in the world. Every night exactly at 8 o'clock the lights of the city are momentarily dimmed, enabling all its citizens to set their watches and clocks by standard time—a practice which is being emulated in other progressive centers throughout South America.



Photograph courtesy Philadelphia Commercial Museum

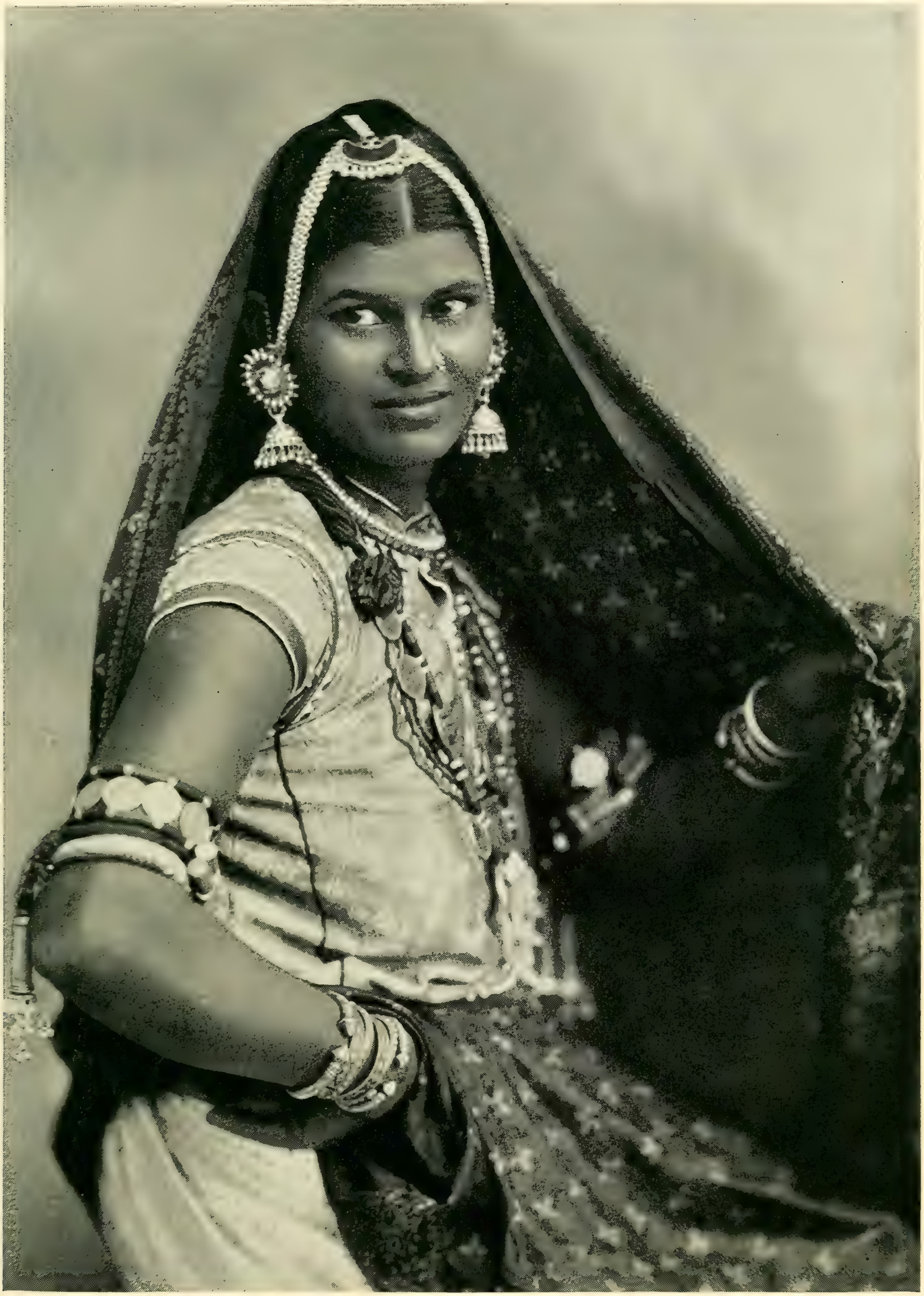
FAMILY TRAVEL IN THE PROVINCE OF PARANÁ, BRAZIL, IS REMINISCENT OF OUR FORTY-NINERS

These pioneers in the fertile but only partly explored state of southern Brazil which stretches from the Atlantic Ocean to the Paraná River have stopped for their evening meal. Paraná produces much coffee, cotton, and manioc, besides cattle. The town on the horizon is Castro, 85 miles north of the provincial capital, Curityba.



THIS PARAGUAY INDIAN'S POWERFUL BOW BELIES HIS REPUTATION FOR TIMIDITY

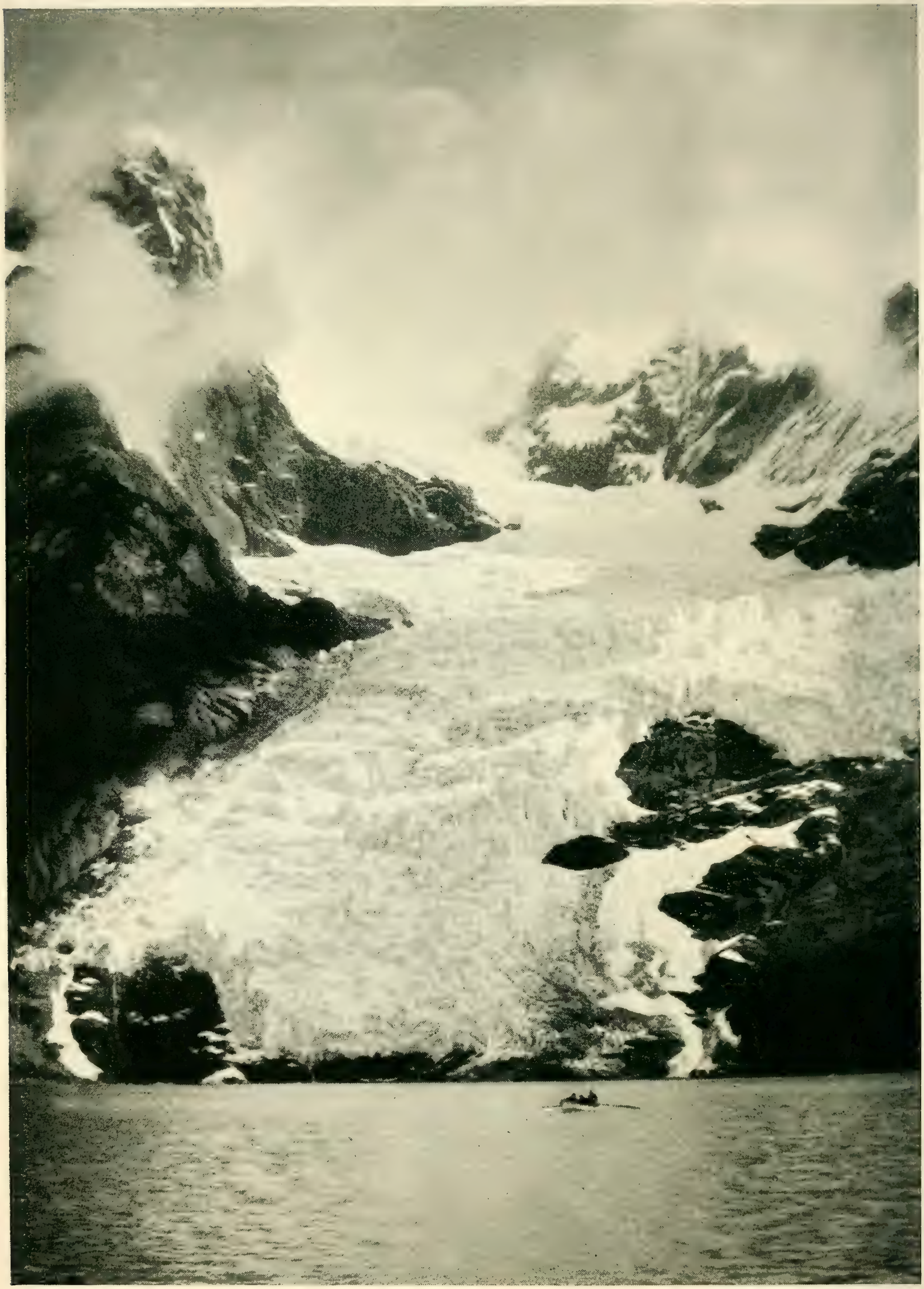
He is a member of the once numerous but fast vanishing Guayaquis tribe inhabiting the fertile region between the Paraguay and Paraná rivers. His head-dress is made of jaguar skins; his fingers and feet indicate that he is a victim of elephantiasis. In the background are the remains of one of the famous missions built by the Jesuits many years ago.



Photograph by Eugene Klein

SHE LIVES IN BRITISH GUIANA, BUT HER HOME IS INDIA

More than a third of the population of Great Britain's only colony in South America consists of East Indians who were brought to the Western Hemisphere to work on the Guiana sugar plantations after the abolition of slavery. This young woman, like all the other members of her race in South America, has lost caste in crossing the ocean and will be held in disrepute if she ever returns to her homeland.



Photograph by Richard B. Hoit

NEAR THE END OF THE CONTINENT: BALMACEDA GLACIER, CHILE

The cloud-robed peak at the left towers 7,200 feet above the majestic river of ice, as it slowly slips into the waters of Last Hope Sound. Chile is the longest, narrowest country in the world. If placed along our Atlantic seaboard, it would extend from northern Maine to the Panama Canal, yet at no point is it wider than the State of California.

twice as many miles and several times as many capable of accommodating ocean-going steamers, which ascend 2,300 miles to Iquitos, in the territory in dispute between Peru and Ecuador. Vessels of 14-feet draft can ascend nearly 500 miles beyond this point.

It is as if one could go in a ship of fourteen-feet draft from New York to Salt Lake City by way of Chicago and Cheyenne. Such a navigable river makes the projected Lakes-to-the-Gulf "Fourteen-feet-through-the-Valley" waterway seem insignificant in comparison.

In 1899 the United States gunboat *Wilmington* went up the Amazon to Iquitos. If the Mississippi were as long and deep, such a warship might sail without encountering a single bar from the Gulf of Mexico to Hudson Bay.

The anchors shown on the map beside the various rivers of the continent indicate the head of steam navigation on each major stream, illustrating that South America possesses the finest system of natural inland waterways in the world.

AS MANY CONFLICTING BOUNDARIES AS EUROPE HAD

In the number of its conflicting boundary claims, political South America suggests the overlapping territorial disputes in Europe during the Peace Conference.

Colombia and Venezuela have rival claims to some 40,000 square miles; Colombia and Peru both claim an even larger area; Bolivia and Paraguay contend for a vast extent of territory in the Chaco region; Chile and Peru have a Silesia of their own in the valuable nitrate lands, which have been rocks of contention for many years, and Argentina and Chile both claim a number of islands above Cape Horn. All these disputed areas are adequately shown in colors on the map. Argentina also disputes Great Britain's possession of the Falkland Islands, which her maps designate as the Malvina Archipelago.

Europe is a land of monarchies, Asia is a land of empires and colonies, North America is the home of self-governing colonies and republics, Australia is entirely a self-governing colonial confederation, Africa has only two independent countries; but South America is preeminently the home of self-governing republics—ten of them, ranging in size from Brazil, which is larger than the United States, exclusive of Alaska, to Uruguay, which is not quite equal in area to Nebraska. There are only three colonial possessions of modest territorial extent on the continent, the Guianas—British, Dutch, and French.

THREE INVALUABLE INSET MAPS

The three inset maps will prove of fascinating interest to the lay reader as well as to the student. The great Andean ranges, with their snow-capped peaks and the vast valleys of the three principal river basins are strikingly presented in the Physical Map. The Mean Annual Temperature Map will enable one to fix definitely in his mind the comparative climates in the two continents of the Western Hemisphere, remembering that the sudden sweep northward of the temperate lines on the western coast of South America is due jointly to the high elevation of the Andean system and the chilling waters of the Humboldt Current, which flows northward from the Antarctic, exercising an influence exactly opposite to that of our own Gulf Stream.

South America's wealth in natural resources is clearly presented in the Products Map, which shows the vast extent of the rubber forests of the Amazon basin, the regions from which Argentina, Paraguay, Uruguay, Colombia, and Venezuela draw their valuable exports of cattle, hides, mutton, and wool, the nitrate lands of Chile and Peru, the rich coffee, sugar, and cocoa plantations of Brazil, the Guianas, Venezuela, and Colombia, and the silver, copper, gold, iron, and tin deposits of the several republics.

In this Map of South America members of the National Geographic Society possess a cartographic product which in its wealth of accurate information and clarity of presentation is of unique excellence. It is believed that it will prove an important factor in promoting the commercial and friendly political relations with our neighbor republics of the Southern Hemisphere.

The United States has always commanded a large share of South America's foreign trade. In a recent year Argentina

Photograph by Joseph E. Pogue

A PICTURESQUE NATIVE BOAT AT BUENAVENTURA: COLOMBIA

bought three-eighths of her imports from us. Brazil spent in our country approximately one-half of her money for imports, and Chile gave us practically the same proportion of her foreign purchasings. Colombia was an equally good customer in proportion to her total importations, while Peru gave us nearly two-thirds of her total foreign orders. More than two-thirds of Venezuela's foreign business was done with American houses. Ecuador was also a good customer, looking to us for 45 per cent of her importations.

Bolivia, Paraguay, and Uruguay gave American exporters a smaller percentage of their orders—one-fifth in the case of the first two, and only an eighth in the case of Paraguay.

In turn, we bought more than half of the exports of Chile, Colombia, Peru, and Venezuela, nearly half of those of Brazil, and nearly a third of those of Argentina.

PREVIOUS ARTICLES ON SOUTH AMERICA

In addition to the articles appearing in this number of THE GEOGRAPHIC, the following articles, previously published, will prove of interest, especially those describing the National Geographic Society's expeditions to Peru and the discovery of the Lost City of the Incas:

"The First Transandine Railroad from Buenos Aires to Valparaiso," by Harriet Chalmers Adams, May, 1910; "A Visit to the Brazilian Coffee Country," by Robert De C. Ward, October, 1911; "Explorations in Peru," April, 1912; "The Countries of the Caribbean," by Dr. William Joseph Showalter, February, 1913; "In the Wonderland of Peru," by Col. Hiram Bingham, April, 1913; "Some Personal Experiences with Earthquakes," by Rear-Admiral L. G. Billings, January, 1915; "The Story of Machu Picchu," by Col. Hiram Bingham, February, 1915; "Further Explorations in the Land of the Incas," by Col. Hiram Bingham, and "Staircase Farms of the Ancients," by O. F. Cook, May, 1916; "The Awakening of Argentina and Chile," by Dr. Bailey Willis, August, 1916; "Peru's Wealth-Producing Birds," by Dr. R. E. Coker, June, 1920; "Kaieteur and Roraima, the Great Falls and the Great Mountain of the Guianas," by Prof. Henry Edward Crampton, and "Rio de Janeiro, in the Land of Lure," by Harriet Chalmers Adams, September, 1920.

BUENOS AIRES AND ITS RIVER OF SILVER

A Journey Up the Paraná and Paraguay to the Chaco Cattle Country

By William R. Barbour

As YOUR ship, at the end of its seven-thousand-mile journey from New York, breasts the current of the majestic Rio de la Plata, and the white buildings of Buenos Aires appear low in the west before you, you are, perhaps, disappointed especially so if you have stopped en route at Rio de Janeiro and been privileged to view its fairy-like setting, with the mountains girt about it and the blue Atlantic laving its curving shore-line.

Like a person of retiring nature, whom you must know long and well to appreciate, Buenos Aires reveals itself little by little to you and twines itself about your heart, till ere long, and so gradually that you have not realized it, its subtle charm has made a lasting conquest.

Your first view shows great white grain elevators in rows along the shore, with one skyscraper of fourteen stories looming up behind them. The great size of the city is not evident, for the land is flat and the warehouses and office buildings close to the busy docks hide all that lies behind.

A CITY WITH NO SLUMS

Nearly every traveler is impressed first of all by the cleanliness of the capital of the Argentine Republic. The industries of the city are confined largely to port activities and trading. Partly for this reason and partly because Argentina has no coal, and hence cannot manufacture cheaply, hideous chimneys and smoke-grimed factories are not numerous. There are no slums. Naturally, there are districts of poverty, but the tenement, as we know it, does not exist. In even the poorest quarters, such as the *"Boca,"* the streets are clean and well paved, and the houses, only one or two stories high, all have *patios* behind them. The houses are tinted cream white or yellowish tan and face directly on the streets, with blank or nearly blank walls.

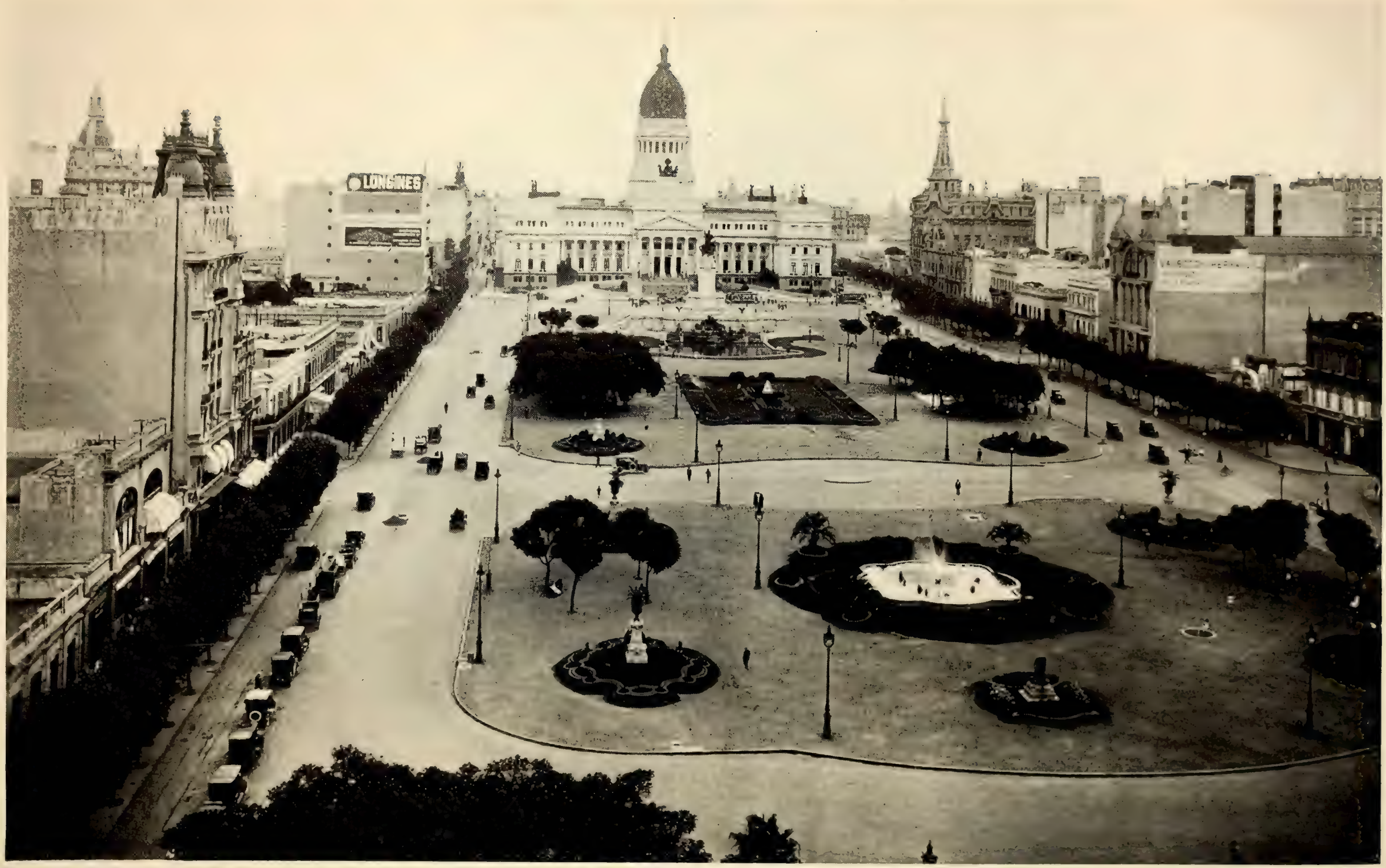
One drawback to the older part of the city is the narrowness of the streets, and especially the sidewalks, which are often three feet or less from wall to curb. There is no excuse for this, for when the city was laid out, the whole vast expanse of the pampas lay open behind it. The newer streets are much wider, often with a ribbon of shrubbery and grass down the center.

Buenos Aires is roughly circular in shape and of immense size, covering some seventy-five square miles. Two of its sides are formed by the Rio de la Plata (so wide that it seems like a muddy sea) and a small stream, the Riachuelo. Along both of these, but principally the former, are the numerous docks, basins, and warehouses. Avenida Rivadavia, starting at the waterfront and running almost due west, divides the city into two roughly equal portions.

Over the greater part of the city the streets intersect at right angles, and it would be a very easy place in which to find one's way around were it not for the fact that the streets are all named instead of numbered, most of the names being historical or geographical. Every country in the world has a street named for it, and every Argentine president, general, or other important personage. Another habit is to name streets for dates, of which there are several roughly corresponding to our Fourth of July. Thus there are Avenida de Mayo, Calle 25 de Mayo, Paseo de Julio, and Parque de las Tres de Febrero.

AVENIDA DE MAYO, THE CHIEF ARTERY OF THE CITY

Much of the city is uninteresting, consisting of block after block of low plaster-covered brick buildings and innumerable small *almacenes* (groceries), *cervecerías* (beer saloons), *cafés* (coffee-houses; here a café is not a restaurant, as in United States), *cigarrerías,* and *loterías* (shops where lottery tickets are sold).



Photograph by Publishers' Photo Service

ARGENTINA'S MAGNIFICENT CAPITOL, FACING CONGRESS SQUARE

In general outline the stately structure resembles the United States Capitol at Washington. To support the lofty dome, which weighs 30,000 tons, it was necessary to construct an inverted cupola of stone for the foundation. Viewed from above, this cupola resembles a gigantic half of an eggshell.

The chief artery of the city is Avenida de Mayo, stretching from the President's home to the Capitol. The Casa Rosada (Pink House), corresponding to our White House, is a great pink pile, with imposing entrances and handsome carvings and bas-reliefs. It faces the Plaza de Mayo, where on May 25, 1810, Argentine independence was first proclaimed.

This avenue, under which the subway runs, is lined with hotels and fine shops and has many cafés with little tables out on the sidewalk under awnings, *à la Paris.*

Another interesting thoroughfare is Calle Florida, the street of restaurants and jewelry stores. It is so narrow that there is barely room for two cars to pass, and in the late afternoon all traffic is stopped, so that the people may promenade in the street.

Nearly all stores and business houses take a respite in the late afternoon, the Spanish for black coffee and the English for tea.

Buenos Aires was founded in 1580, after colonization efforts in 1534 and 1542 had failed. From the first it had to fight against apathy and even open hostility on the part of the Spanish rulers.

For generations regulations were in force preventing direct commerce between Buenos Aires and Spain, so that goods had to be shipped overland across the Andes, through Bolivia and Peru, thence by vessel to Panama, and transferred across the Isthmus.

Thus handicapped, it is no wonder that the port grew slowly. It was not till the last half century before the Spanish yoke was thrown off that Buenos Aires began to come into its own. Once independence was achieved, it grew rapidly, and when in 1910 the hundredth anniversary was celebrated, it had a population well over a million.

THE GIFTS OF THE NATIONS TO BUENOS AIRES

Much of the city's beauty dates from this centenary in 1910, at which time many countries presented Argentina with commemorative statuary symbolic of the occasion. As is fitting, the gift of the Spanish people is the most conspicuous. In the center of the broad Avenida Alvear, the city's loveliest promenade, rises a great white marble pedestal, crowned with an angel of victory. Below are many other figures and friezes, while the four corners of the pedestal bear bronze groups symbolizing the Andes, the Pampas, the Chaco, and the Mesopotamian region (between the Paraná and Uruguay rivers).

France's contribution is among the finest and also stands beside the Avenida Alvear. It is of rose-colored granite and white marble, with exquisitely carved figures.

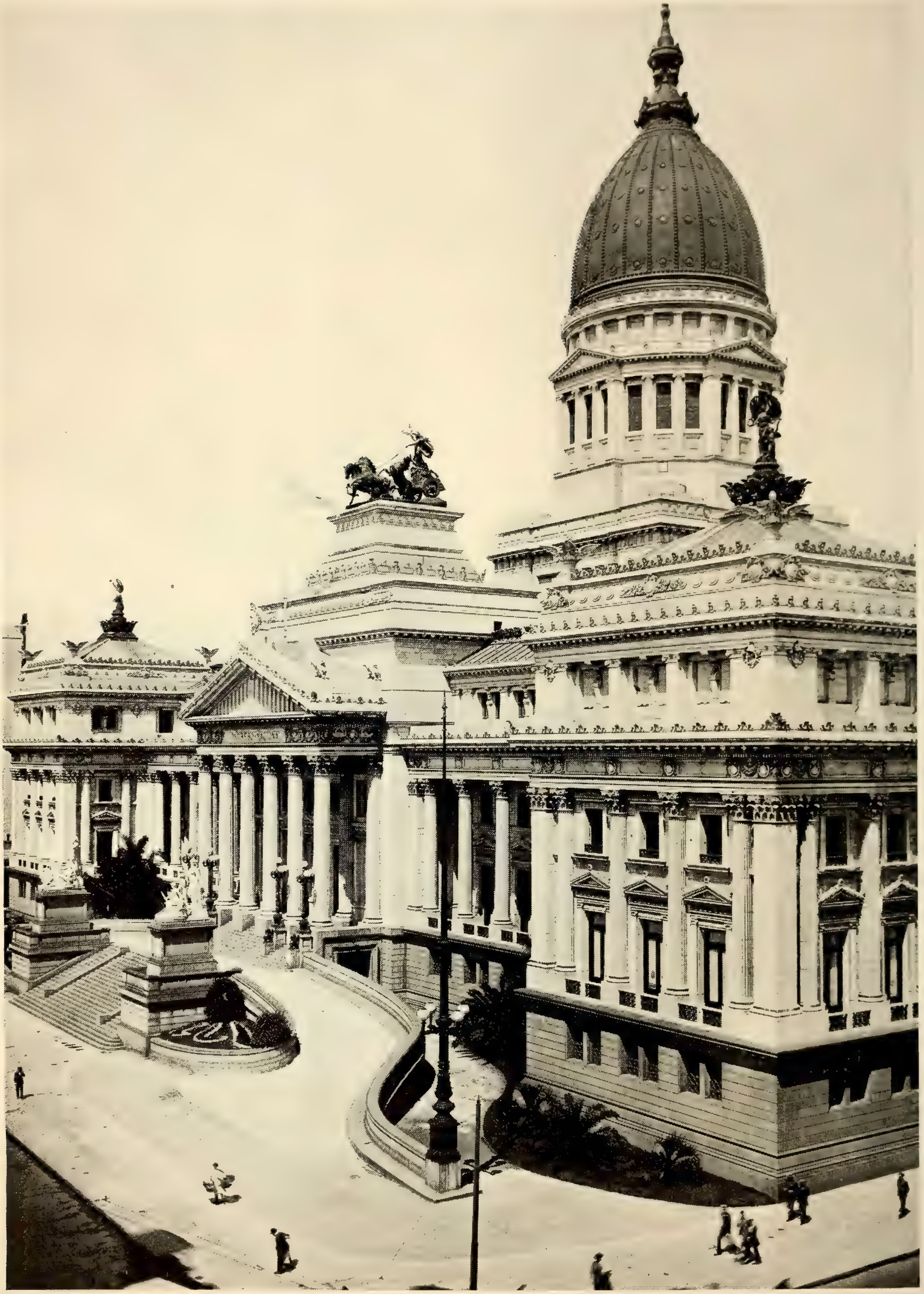
America's gift is not in keeping with her importance, and, standing in a rather obscure corner of one of the parks, is missed by many tourists. It is a bronze life-size figure of George Washington on a severely plain pedestal of pink Vermont granite.

The English commemorated the occasion by the gift of a great red brick clock-tower, in the center of the beautiful Plaza Britannica, opposite the Retiro Railway Station. Germany's gift was a broad white marble fountain; while Italy, in the Plaza Italia, has a large equestrian statue of Garibaldi.

Throughout Argentina, in every city and in many towns, may be seen equestrian statues of San Martín, Argentina's greatest national hero. Among the best is the one in the center of the Plaza San Martín, with bronze battle groups and bas-reliefs, in an excellent setting of palms and formal flower beds.

BELGRANO SUBURBS LIKE A BIT OF ENGLAND

All about the city are suburbs, with which there is good communication by the frequent suburban trains. Of these residential districts Belgrano lies closest and is the best known. It is especially popular among the many British residents, and in some portions, were it not for the Spanish street signs, one might imagine himself set down in England. On one corner is a boys' boarding school, and in the open lot behind it English lads in "shorts"—their Eton jackets and broad white collars laid aside—are engrossed in cricket or football. On another corner is an ivy-clad Episcopalian or Presbyterian church, a bevy of pretty English girls chatting on the steps. Even



Photograph by Publishers' Photo Service

A CLOSER VIEW OF ARGENTINA'S CAPITOL BUILDING (SEE ALSO PAGE 394)

The Senate and Chamber of Deputies have held their sessions in its halls since 1906.

© Keystone View Co.

THE PRINCIPAL THOROUGHFARE OF BUENOS AIRES IS THE AVENIDA DE MAYO

This handsome street extends from the Plaza de Mayo, on which is located the presidential residence, to Congress Square (see page 395). It ranks among the finest boulevards in the world.

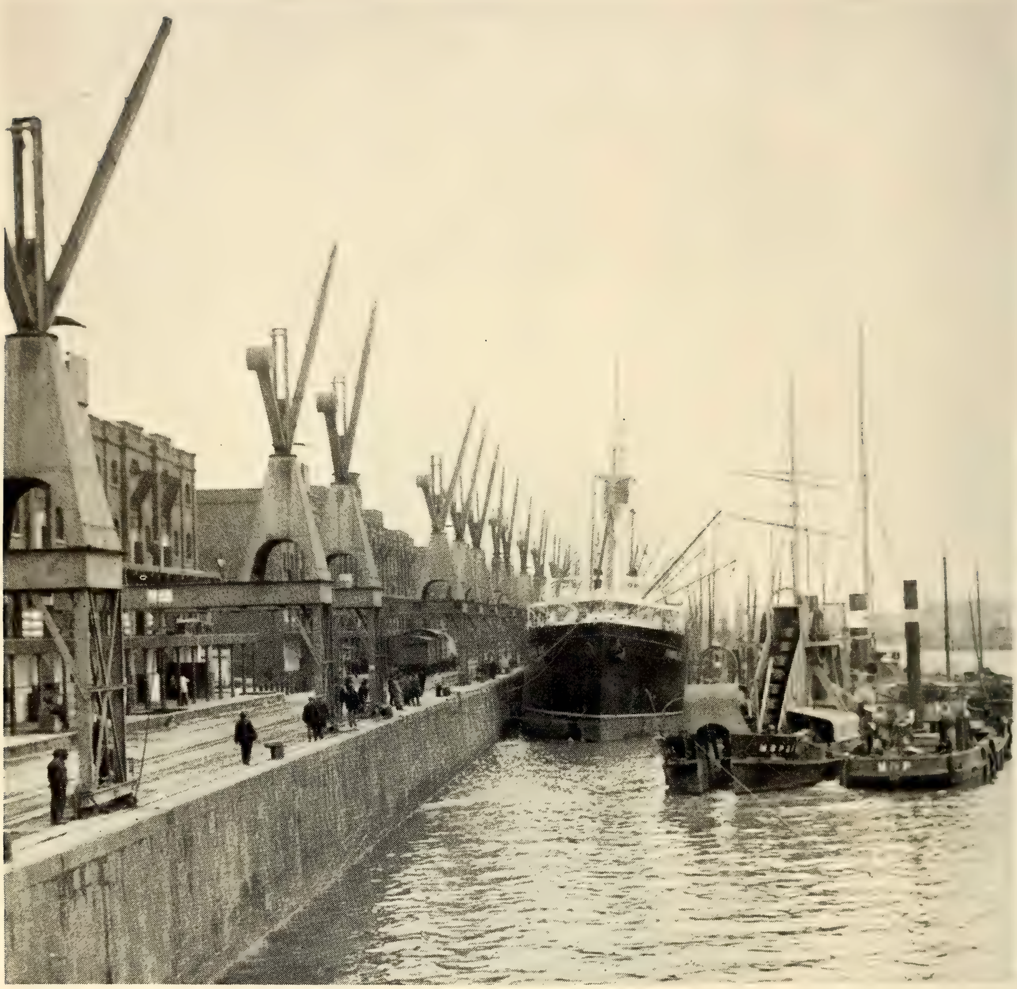
the native policeman greets you, "Good morning, sir," instead of *"Buenos Días, Señor."*

The city with its suburbs has nearly two million inhabitants, almost one-fourth the population of the country. It is the third largest city in the New World and the second Latin city in the whole world. It is sometimes called "The Paris of the New World" and sometimes "The New York of South America." In beauty of buildings and parks, the first name undoubtedly is descriptive, and in financial and commercial importance the second is equally so.

Another resemblance to New York is in its cosmopolitanism. In nearly any popular restaurant one may hear diners chatting in Spanish, French, Italian, German, and English; perhaps also in Russian, Swedish, or Portuguese.

A CITY OF OPPORTUNITY FOR THE IMMIGRANT

Like New York, it is a city of opportunity for the immigrant. Many of the largest businesses are owned by foreigners who landed with their belongings on their backs. Señor Mihanovich came to Argentina a penniless Austrian some forty



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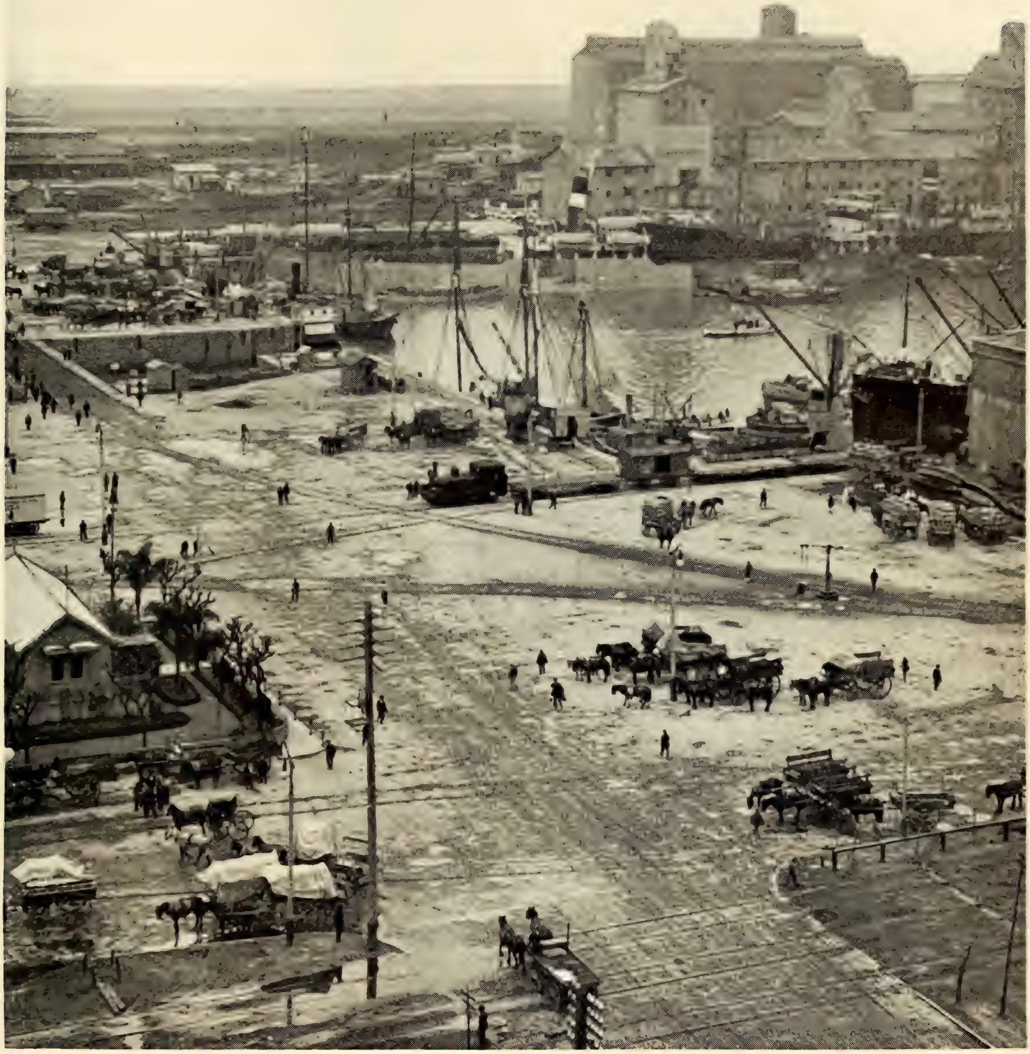
POWERFUL CRANES LINE THE DOCKS OF BUENOS AIRES

The great river port's waterfront, extending for miles, is admirably equipped with the most modern loading and unloading mechanism, but the silt brought down by the Rio de la Plata is a perpetual problem to harbor engineers.

years ago and worked for thirty cents a day. With his savings he bought a rowboat, and ferried passengers across the *Boca,* or "mouth," of the Riachuelo. When he died, a few years ago, he was the owner of some two hundred and fifty vessels, plying all the rivers of the country, and his fortune was valued at many millions of *pesos.*

In no other country except the United States do foreigners so soon become assimilated. Generally speaking, there are no foreign quarters. True, Italians are numerous in the city of Rosario and in the wine belt around Mendoza; Germans have settled largely in the province of Santa Fé and the Welsh in Patagonia; but the second generation is Argentine, heart and soul and language.

Only the English are exceptions to this rule. They keep their mother tongue and customs generation after generation. Thousands of them, whose families had been in the country for generations and whose Spanish was no less fluent than their English, flocked home to fight in 1914. Many of them had never seen England, nor had their fathers before them.



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A VIEW OF THE SHIPPING AND DOCKS OF BUENOS AIRES FROM THE CUSTOM-HOUSE TOWER

The streets leading to and along the harbor front, of unusual width to accommodate the immense volume of traffic, are cut with the tracks of the great railways of Argentina and with the spur-tracks by which they connect with the little railroad that traverses almost every nook and corner of the vast dockage and warehousing space.

While Buenos Aires is thought of as a Spanish city, true Spaniards are not in a majority.

The capital of Argentina is preëminently a city of wealth and pleasure. Unlike wealthy Americans, who have their places of business in the city, but live in the country, many of the richest land-owners, who number their acres by the tens of thousands, have their palatial homes in the heart of Buenos Aires and only at infrequent intervals visit their immense ranches, which are managed by overseers.

A PARADISE FOR THE GOURMET

Buenos Aires is *the* city for the gourmet. No matter what one's taste or nationality, there is a restaurant made to his order.

Photograph by William R. Barbour

CONGESTED SHIPPING IN THE HARBOR OF THE CITY OF "GOOD AIRS"

Although Argentina has only a little more than one-seventh the total area of South America, it possesses more than two-fifths of the total railway mileage of the continent. Most of the lines are concentrated in the three provinces of Buenos Aires, Entre Rios, and Córdoba (see The Map of South America supplement in this number).

Are you a Frenchman, loving the delicate entrées, the dainty trifles of the menu? *Voilà!* there is the Petit Salon.

Do you, as an Englishman, crave the "roast beef of Old England," beefsteak and kidney pies, musty ale, and such dishes of your home land? You have only to visit one of the excellent English restaurants, where the bill of fare is printed in parallel columns, English and Spanish.

Only the American will miss his boyhood dishes, for nowhere will he find baked pork and beans, griddle cakes, or American pie. Ice cream is beginning to be popular, but, in spite of the excellent ingredients used, is not like the product of the States.

A DINNER AT EDUARD'S

There are big restaurants, gilded and bedecked, with imposing orchestras and all the life and sparkle of a Broadway establishment before the drought. And, for those who can find them, there are unassuming places tucked away on side streets, where one may dine quietly, without music or ceremony, and experience the joys of the true epicure. Let us assume that we are of the Fortunati, and after a long walk through the gay night streets find a table at Eduard's.

The room is small, with perhaps a dozen small tables and only three or four waiters. As we enter, on our left is a glowing fire before which sundry plump fowls are roasting, whose odor is in itself an appetizer. The *lista de platas* handed us by a silent waiter contains scarce half a page of dishes.

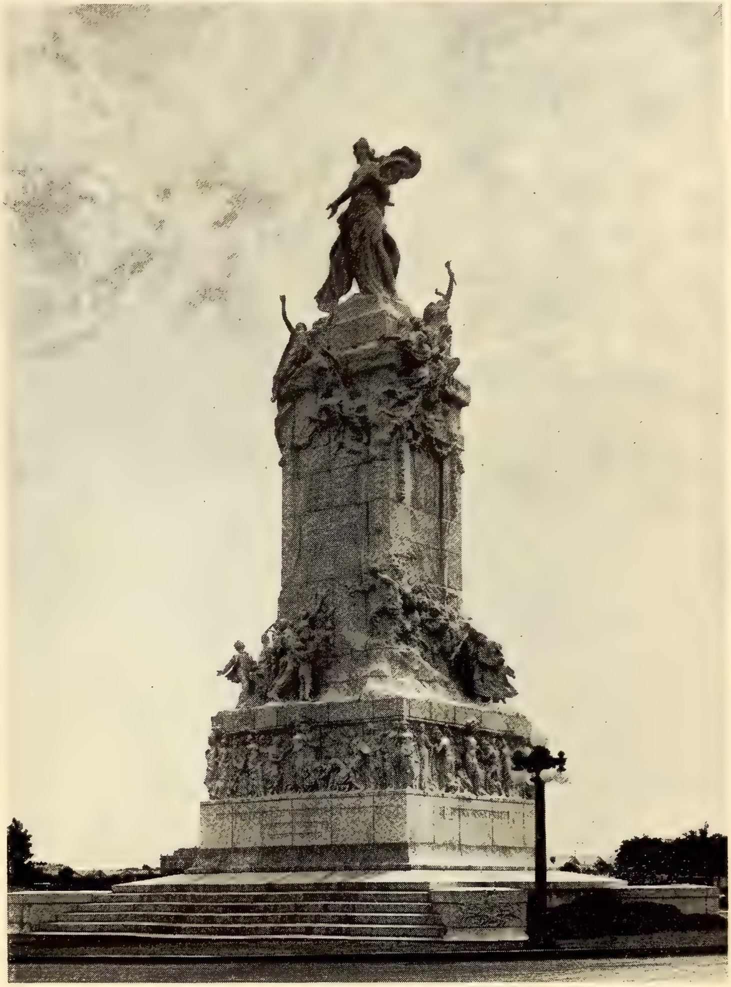
If we wish, we may begin with a San Martín cocktail, named after the liberator of Argentina and a credit to him.

Let us follow the native custom of beginning our meal with *fiambre*. A waiter brings a great tray laden with thin, cool cuts of meat—ham, breast of turkey, veal loaf, a dozen kinds. Let him pile your plate high. Whether it is the climate or the wonderful freshness and quality of the meat, you may eat as much as you want and still have your gustatory faculties unimpaired for the meal to follow.

We may have soup if we wish, and the Argentine soups, rich and delicious, served with grated cheese, are unalloyed perfection. But suppose we pass on to fish. No question there! *Filet de pejerrey,* *frito. Pejerrey* signifies "king of fishes." No fish on earth can excel it in flaky white deliciousness.

Now for the main course. One of the fowls roasting before that glowing wood fire tempts us sorely, but we have a better treat in store and order full portions of *Tallarines à la Eduard. Tallarines* are a sort of macaroni, in flat strips instead of tubes. Eduard guards his secret well, but we detect in the delectable mixture brought us in a casserole steaming hot from the oven cubed breast of chicken, mushrooms, a piquant trace of cheese, a wonderful light-green cream sauce, and seasonings beyond our knowledge.

The portions are generous, all we can eat; for, as the waiter explains smilingly when in our broken Spanish we comment on the liberality, *"Es un costumbre de la casa, Señores."* We have no quarrel with such a custom of the house.



Photograph from Publishers' Photo Service

SPAIN'S GIFT TO HER FORMER COLONY

During the centenary celebration of Argentine independence this impressive pedestal, surmounted by an angel of Victory, was unveiled as a symbol of the Mother Country's good-will.

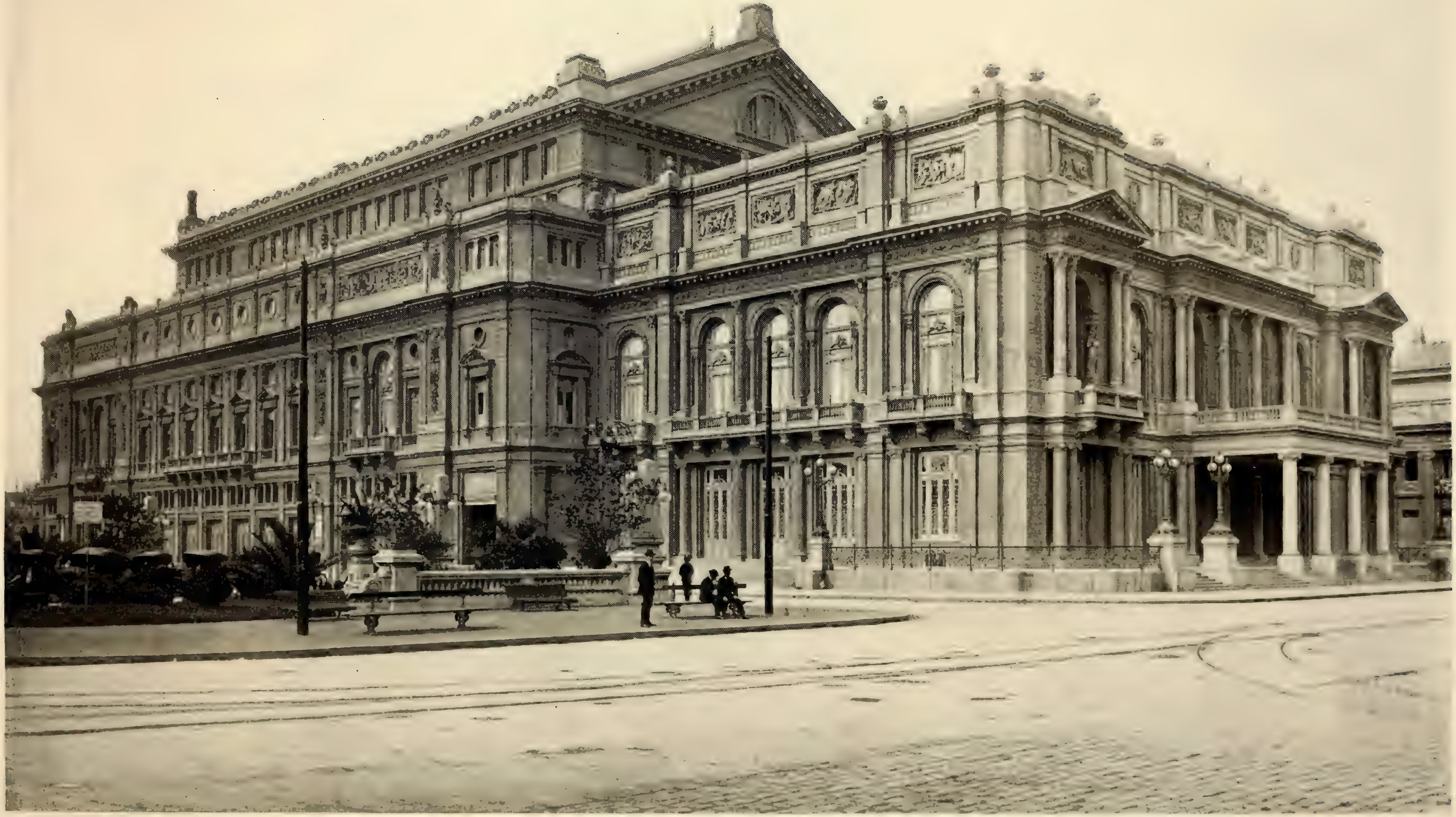
Perhaps with our meal we have chosen a bottle of *vino tinto,* that fine red wine from the sun-bathed slopes of the Andes. Then a trifle of salad, if you wish it, with only cheese—rich, crumbly cheese from Chubut, far down in Patagonia—to follow it, and a slice of that delicious quince confection, *dulce de membrillo.*

Black coffee, of course, and he who has not been to Latin America knows not what coffee may be when prepared by a race which has made it a national drink for centuries. If you want it, doubtless in some dusty corner of the wine cellar is tucked away a bottle of Chartreuse or Benedictine, golden and syrupy with age.

Not a pretentious meal? Perhaps not, but perfect in every detail, and one that will linger longer in your mind than many a more elaborate banquet.

NO GRAVES IN LARGE CEMETERY

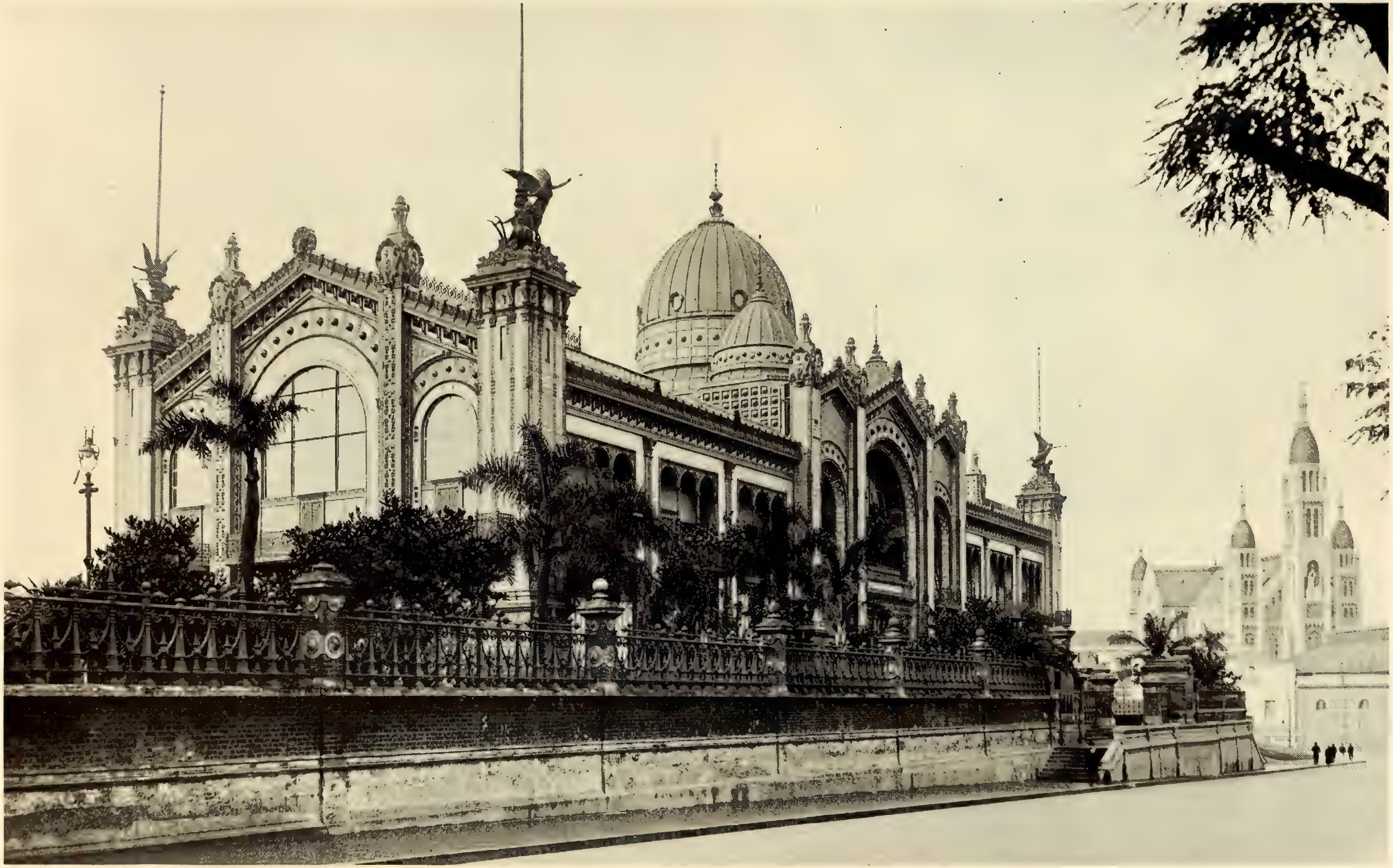
On a Sunday or *fiesta* (religious holiday) it is interesting to visit one of the great cemeteries. Recoleta and Chacarita are the most famous. The former is the older and is no longer used for burials, except by a few families whose mausoleums are not yet filled. Though smaller, it has the more lovely setting. One enters it by a broad flight of white marble stairs flanked by lawns and flower



Photograph by F. Lamson Scribner

ARGENTINA'S HOME OF DRAMATIC ART: THE MUNICIPAL THEATER AT BUENOS AIRES

Built at a cost of two and a half million dollars, the Teatro Colón is chiefly devoted to Italian lyric opera during the winter season (from May to August). The world's greatest artists have sung in this theater, the late Enrico Caruso having been a prime favorite with the Argentines.



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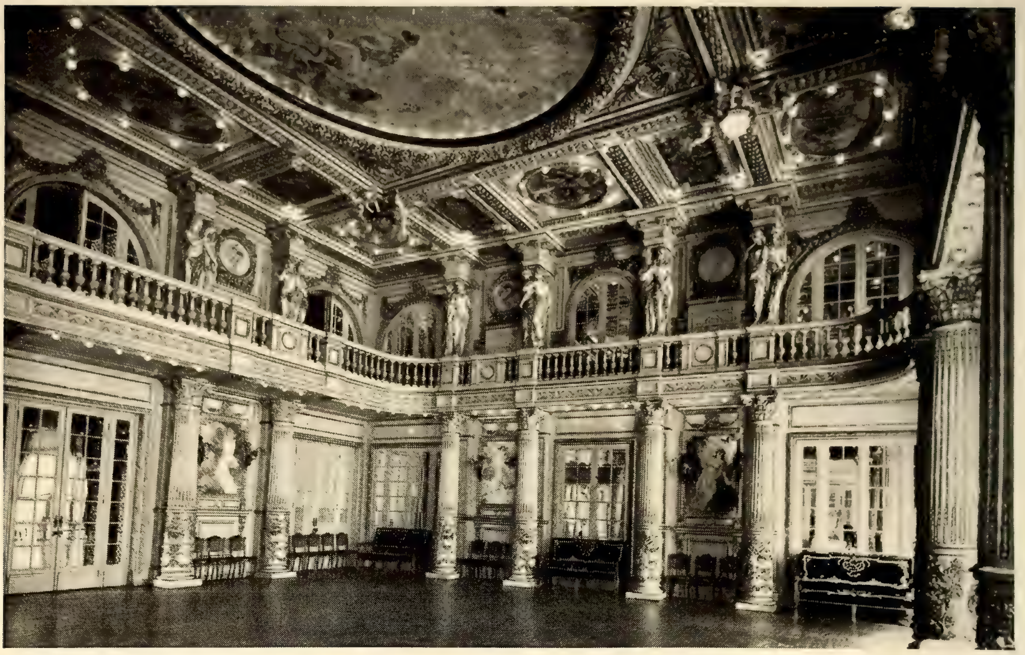
BUENOS AIRES HAS UTILIZED AN EXHIBITION PAVILION FOR ITS MUSEUM OF FINE ARTS

This is not the permanent home of the city's valuable collection of paintings and statuary, however. It was used to exhibit Argentina's products during the Paris Exhibition of 1889.



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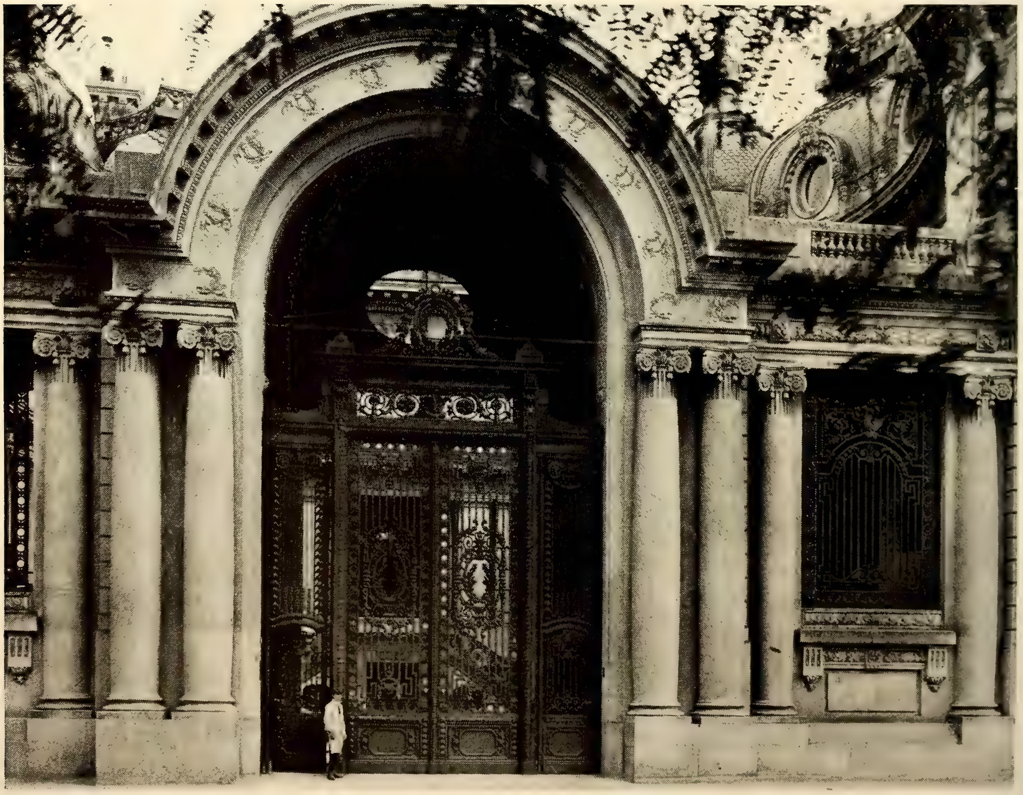
THE BALL-ROOM IN ONE OF BUENOS AIRES' FINEST HOTELS



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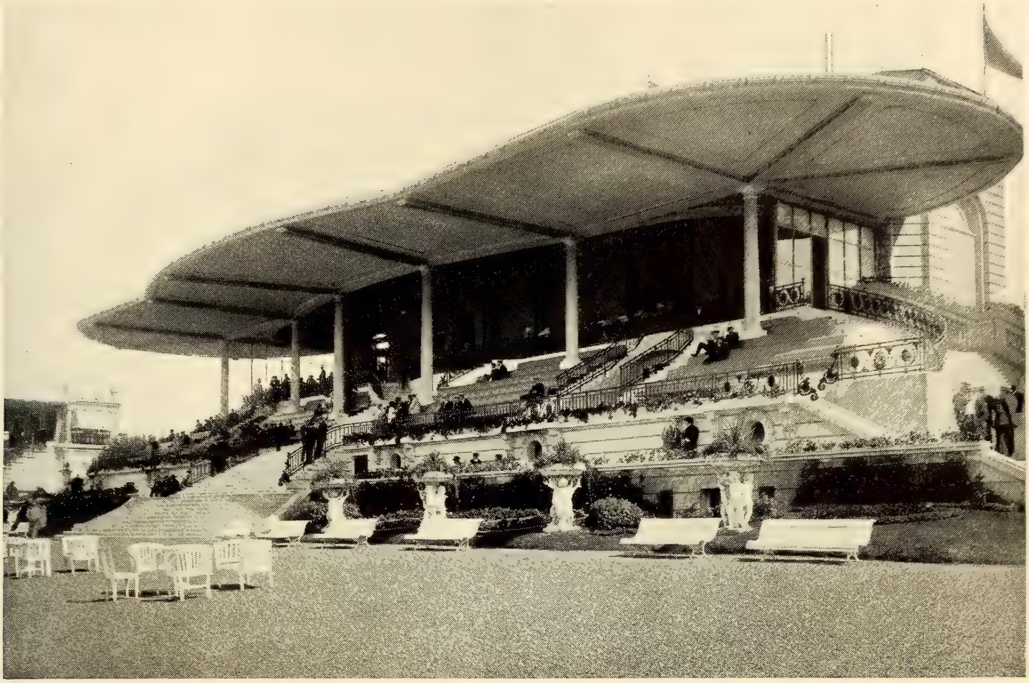
THE ENTRANCE TO A PRIVATE RESIDENCE IN BUENOS AIRES



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GRAND STAND OF THE JOCKEY CLUB, BUENOS AIRES' MOST FAMOUS SPORTING ORGANIZATION

The horse-races of the Palermo Hippodrome, as the track is called, are held all the year round, but the most important events are scheduled from April to November.

beds. Visitors are forbidden to take photographs there.

The Chacarita Cemetery is much larger than Recoleta, but arranged on the same lines. As in New Orleans, graves are not used, but all burials are in mausoleums above ground. Many of these are very beautiful, with carved angels, massive marble walls, and glass doors protected by ornamental ironwork.

Usually the doors are locked, but are opened on holy days, when relatives spend long hours with their loved departed ones, and in every mausoleum one may see black-clad women seated on low chairs or kneeling on stools, telling their beads and tending the waxen tapers and incense lamps.

The coffins are arranged upon shelves, tier on tier, covered with lovely hand-made lace draperies and usually piled high with flowers.

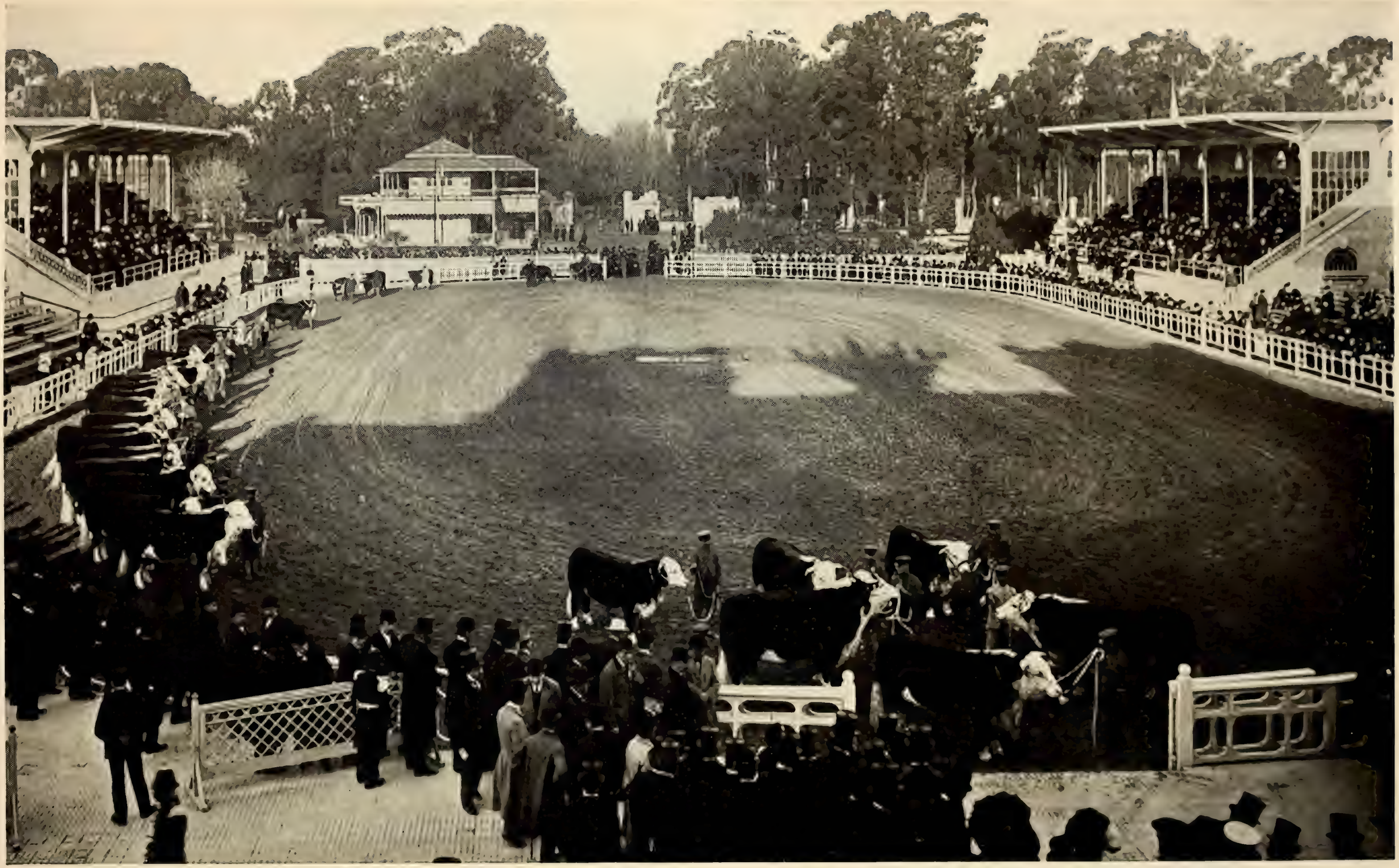
Up and down the narrow streets, between the houses of the dead, stroll many people, and the scene, while not lacking in solemnity, has none of the melancholy of our cemeteries. It seems as if the Argentines keep in closer touch with their dead than they could if they were buried in the dark ground. This impression is heightened by the architecture of the tombs, whose soaring angels and uplifted crosses speak of hope and of faith in future reunions.

PHILADELPHIAN BECAME ARGENTINE HERO

Two or three hours in the Historical Museum are well worth while. It is filled with mementos of the various famous men of the republic, such as San Martín, Belgrano, Rosas, and Lavalle. There are old uniforms, weapons, and pictures galore, emblazoned battle flags taken in the wars with Paraguay, cannons captured from the British, and other relics.

Public life must have had its disadvantages, judging from numerous pictures labeled "Last moments of General Blank" or "Execution of General Blank."

One may also see "Uniform worn by



Photograph by F. Lamson Scribner

THE BUENOS AIRES ANNUAL CATTLE SHOW RIVALS THE FASHIONABLE HORSE SHOW OF NEW YORK

The wealth of Argentina is founded on live stock and wheat. This is the stock-reviewing stand of the Argentina Rural Society, devoted to the development of agricultural and pastoral interests of the country. It organizes annual exhibitions and fairs, where the best products are displayed.

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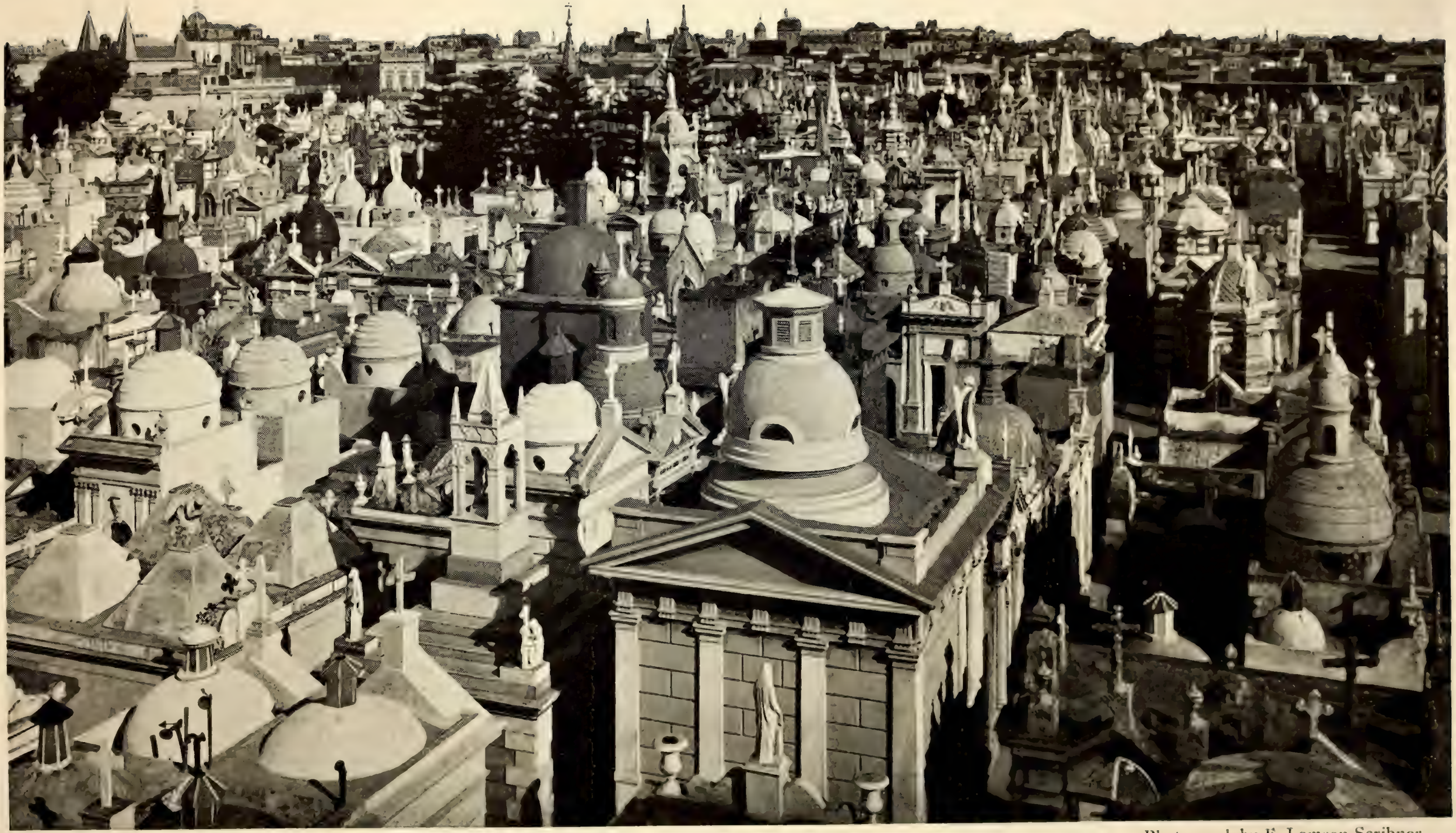
THE PALACE OF JUSTICE IN BUENOS AIRES

In the main auditorium of this impressive building, dedicated to Argentina's law courts, the Fourth Pan American Conference was held. Across the plaza is the Municipal Theater (see page 402).



Photograph by F. Lamson Scribner

A SEA OF MAUSOLEUMS: THE RECOLETA CEMETERY, BUENOS AIRES

For the beauty of its monuments and vaults, this city of the dead is said to be second only to the cemetery at Milan. Here are the last resting places of Argentina's most noted men (see text, page 401).

President Blank the day he was assassinated" and the "Dagger used by murderer of General Blank."

One perennially popular Argentine hero is Almirante (Admiral) Brown, a Philadelphian, who came to the country about 1800 and took command of the Argentine navy, waging a John Paul Jones type of warfare against the Spanish frigates.

A CITY OF PARKS AND PLAZAS

Buenos Aires is a city of parks and plazas. Seldom need one be out of sight of trees and fountains. The plaza may be of an acre or less, but it will have palms and other lovely trees, fountains, white statuary, and flowers in abundance. There are some sixty plazas occupying a block or more, not counting tiny breathing spots at street intersections, and fifteen great parks, of which at least three have areas of a square mile each.

Few places offer the gardener such coöperation in fertility of soil and temperate climate. Where else may one find palms and pines, guavas and geraniums, cypresses and cedars, oaks and oleanders, growing side by side and each attaining its maximum development?

Geraniums climb fifteen feet or more; sweet peas nod over ten-foot walls; roses bloom both in spring and in fall.

Only a few plants from the hottest portions of the tropics (such as Victoria regia water-lilies) need coddling, while spruces, firs, and birches from the colder parts of the earth thrive amazingly. The eucalyptus from far-off Australia does well, but no better than the American white pine, Canary Island palm, and English oak.

It is in Palermo, that belt of parks and gardens along the shores of the Plata, in the northern part of the city, that many of the finest scenic effects may be found.

Here is located the huge Parque de las Tres de Febrero (Park of the Third of February), with its lagoons, shaded bridle-paths, and winding driveways. In this park is the famous Rosery, where, in the space of a few acres, have been brought together over five thousand named species of roses.

One enters the Rosery by a rustic bridge across a lovely arm of the park lake and finds himself in an immense garden laid out in blocks like a city, with wide paths for streets. At frequent intervals are white benches and everywhere roses—white, pink, red, yellow, single and double, large and small; roses whose sturdy stems are like small trees; climbing roses clustering over pergolas and arbors; beds of rare dwarf roses; white statuettes half concealed in masses of bloom.

The garden's charm is not at its least at night, when the white-globed lights blend with the moon to lend the illusion of fairyland.

In Palermo are also found the Jardín Botánico and the Jardín Zoológico. The former stands as an everlasting memorial to its designer and first director, Carlos Thays.

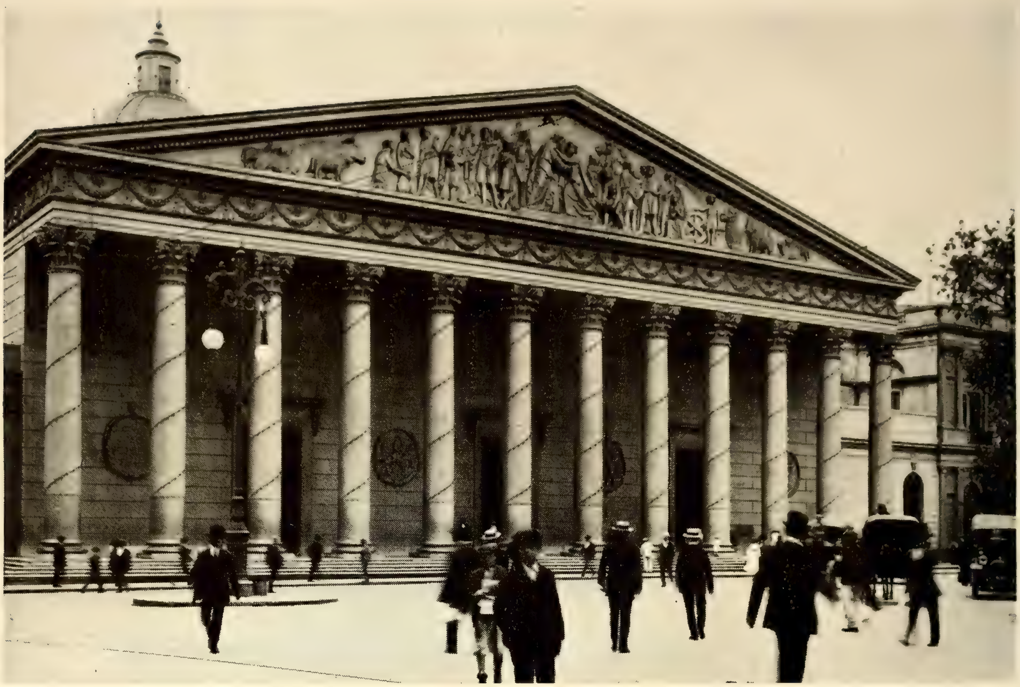
This landscape architect, a native of Paris, began his work in Buenos Aires in 1891 and continued it for over twenty years. He journeyed through the length and breadth of the republic, noting and collecting hitherto-unknown flora to form the basis of the garden. He was consulted by the municipalities of Montevideo, Santiago, Valparaiso, and Rio de Janeiro, and aided nearly all the cities of Argentina in landscape-gardening projects.

His work in the Buenos Aires Jardín Botánico has been worthily carried forward by his successors, until today the garden stands as a finished jewel of verdure and bloom.

Each of the provinces and territories of Argentina, as well as the countries of Brazil, Chile, Uruguay, and Paraguay, and regions of Europe, Asia, Oceania, Africa, and North America, has a section dedicated to its peculiar flora. In the North American section may be found white pine, yellow poplar, various maples, ash, birch, etc. The section tends to make the American visitor homesick, and the trees themselves look lonesome, with so many strangers of the plant kingdom all around.

Another portion of the garden has thousands of specimens arranged by family—Rosaceæ, Leguminosæ, etc. Still another section has plants grouped by their uses—*i. e.*, tanning, dye, medicinal, oleaginous, poisonous, and textile.

Two of the loveliest spots in the garden are the Jardín Francés and the Jardín



Photograph by Newton W. Gulick

THE CATHEDRAL OF BUENOS AIRES RESEMBLES THE MADELEINE OF PARIS

But the rows of electric lights entwining the twelve Corinthian columns impress the traveler from the north as a somewhat bizarre decoration. San Martín, the statesman and soldier, who was primarily responsible for the independence of Argentina, Chile, and Peru, lies buried within.

Romano. The former represents a formal French garden, with its clipped box hedges, geometrical flower beds, statues, and massive marble urns. The Roman garden has statues of Pliny and of the Roman wolf and vegetation and settings distinctively Italian.

The Argentine trees are puzzling to the American visitor, as most of them have no counterparts at home. There are a few beeches, walnuts, etc., which are easily recognized, but the majority have no close relatives in continental United States. The names of the trees are not, in the main, Spanish, but Guaraní Indian, such as *timbó, ombú, jacarandá,* or *ibarapitá* (most Guaraní names are accented on their last syllables).

Generally speaking, the trees are hardwoods—though there are a few cone-bearers—and make very heavy, durable lumber, usually of attractive color and susceptible of taking a high polish. Most of them are not used to any great extent except locally.

Many native species have wonderful flowers. In spring the *timbó* trees are covered with masses of brilliant vermilion blossoms, and the *tipas* with clusters the shape and color of wisteria. Later the *palo borracho* is covered with pink and yellow lilies.

The Zoölogical Garden, which adjoins the Botanical Garden, is of more interest from its beauty of setting than from its collections. In the past few years the animals have suffered from *aftosa,* the foot and mouth disease, which has been prevalent in Argentina, and many of the cages are empty.

Especially to be noted are the birds, which are so tame that they wander about the lawns and groves entirely at will. On a sunny afternoon the Zoo is well worth visiting, if only to see the people. Nurse-maids with their charges, school children, elderly ladies, people of every class and caste, stroll leisurely along the shady paths, rest on the benches, take tea in the pavilion, or promenade past the grand-stand, where a municipal band plays classical and patriotic music.

Photograph by Publishers' Photo Service

THE MUSEUM OF THE MODERN CITY OF LA PLATA: ARGENTINA

La Plata was founded 39 years ago as the capital of the Province of Buenos Aires when the latter was separated from the national capital. It is admirably planned, with broad avenues cut by diagonal boulevards, somewhat after the style of Washington, D. C.

It is in such places as these, rather than at the races or the opera, that one sees the Argentines as they are, a courteous, proudly democratic, altogether likable people.

A VOYAGE UP THE WORLD'S SECOND LARGEST RIVER

Almost from the days of Columbus, the great waterway of the Rio de la Plata has been one of the most traveled trade routes of South America. Hardly had the Spanish explorers entered its estuary, in the early years of the sixteenth century, and founded the towns of Montevideo and Buenos Aires on its banks, before they pushed on up the river, seeking a passage which might lead them through to the Indian Ocean and the Isles of Spice.

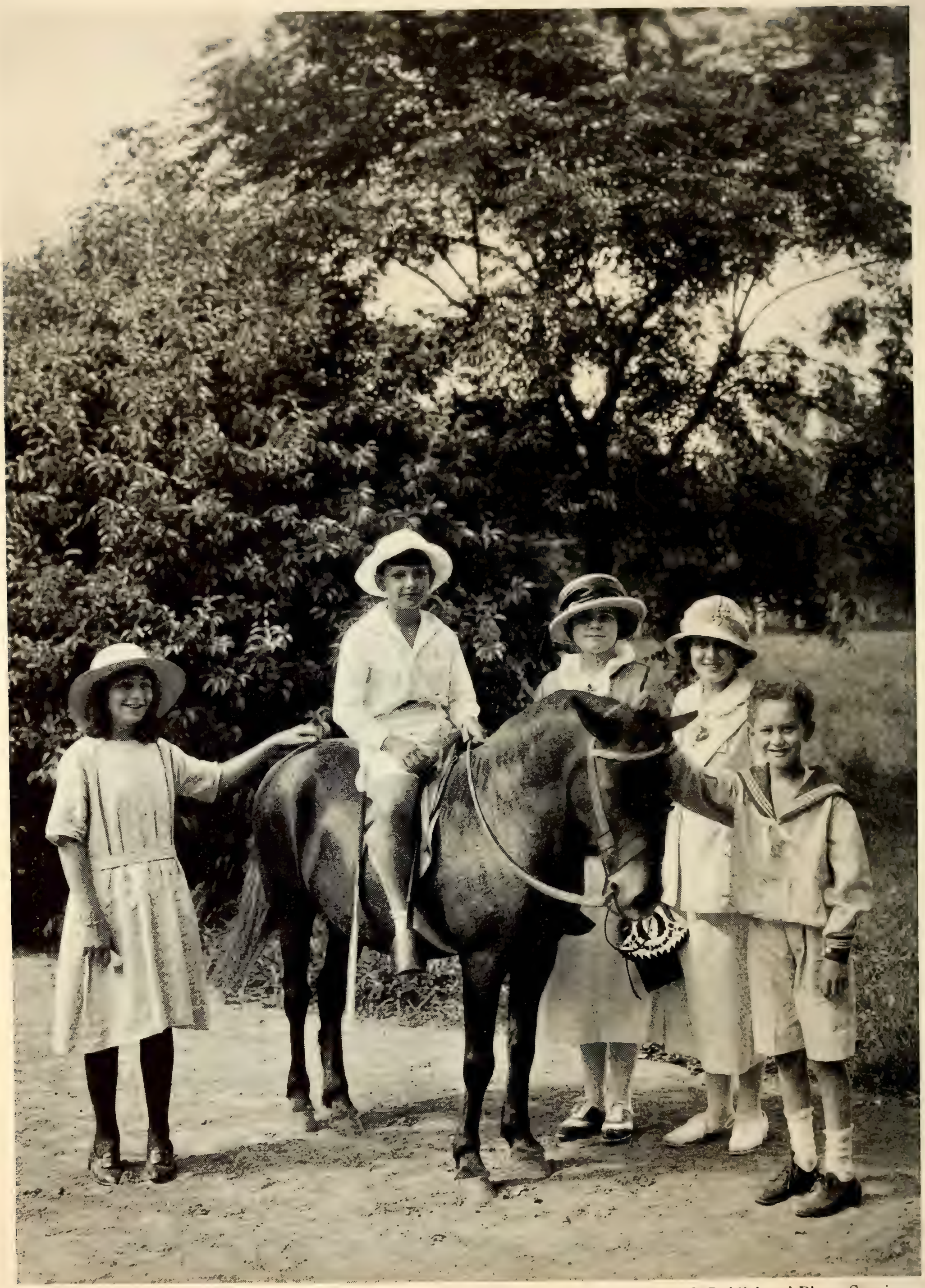
The great stream, which in volume of water is second among the rivers of the earth, has for four hundred years been the main artery of traffic for Argentina, Uruguay, Paraguay, and southern Brazil, in spite of the fact that at least half of the territory it drains is only beginning to be developed and that a large percentage of it has never even been explored.

From Buenos Aires to Asunción, the picturesque old capital of Paraguay, an excellent line of river boats affords bi-weekly sailings, the time en route being four days upstream and three and a half days returning.

We left Buenos Aires one cool, showery morning in December (early summer) on the side-wheel, twelve-foot-draft steamer *Berna,* and after being out of sight of land for hours, in a turbid, muddy sea, reached the confluence of the Uruguay and Paraná rivers and turned northwest up the latter. The stream was miles wide, the color of coffee with cream, and broken by numberless marshy islands. The shores on the left were covered with plantations of poplar and willow.

A GLIMPSE OF ROSARIO, ARGENTINA'S SECOND CITY

Next morning we made our first stop at Rosario, the second largest city of Argentina and a notable shipping point



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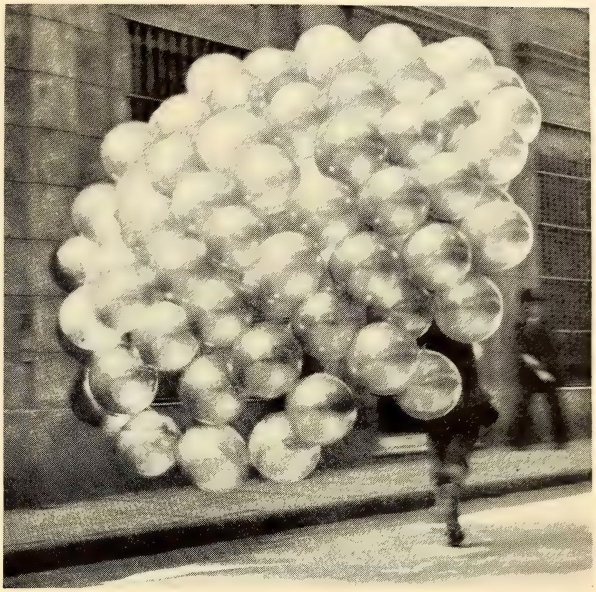
A FAMILY GROUP IN A BUENOS AIRES PARK

The boy on the pony is the son of a millionaire ranch owner who makes his home in the national capital and leaves his cattle in the hands of overseer and gauchos.

for grain and flaxseed. It is located on high clay bluffs west of the river along whose banks there lie huge grain warehouses and elevators which cut off our view of the city proper, with its 250,000 people, a large part of whom are Italians. The water beside the Rosario docks is deep enough for ocean freighters, and the city serves as port of outlet for a great agricultural section.

In the afternoon we came to Diamante, lying east of the Paraná, in the rich province of Entre Rios. Here also there are warehouses close to the river, but most of the town lies farther back, above sixty-foot terraced clay cliffs. All this part of the river has alternate marshes and crumbling high clay banks.

About sunset, imposing white stuccoed church towers came into sight ahead, and rounding a great bend we came to Paraná, capital of the province of Entre Rios. It is a town upward of 50,000 people, and exports large amounts of hides and cereals; its wharves are equipped with traveling cranes and backed by solidly built concrete warehouses.



Photograph by Newton W. Gulick

THE BALLOON-MAN IN BUENOS AIRES

He runs as fast as he can through the principal business streets with his inflated wares. On each balloon is the name of the largest retail dry-goods establishment of the city. He sells his balloons and at the same time advertises his employers.

A wonderfully clear and balmy moonlight night followed. The river slipped quietly by, its ripples reflecting the winking lights of buoys which the Argentine Government has recently established as far as Corrientes.

FLOATING ISLANDS HARBOR HORDES OF SNAKES

When day came the character of the country had changed. On each side stretched endless reaches of low, partially inundated country, densely wooded with strange tropical trees, interspersed with an occasional "feather-duster" palm. The wide flood was dotted with islands, large and small, among which the buoyed channel meandered. *Camalotes,* which the Spanish dictionary defines as "river plants in South America resembling a floating island," began to drift by. Usually only a few would be joined together, but occasionally our boat would swing abruptly aside to avoid patches which had collected about some floating uprooted tree to form islands fifty feet across.

These *camalotes* make their appearance in times of high water, being carried out into the current from the adjacent swamps. They always harbor many snakes. In 1905 a great flood brought so many of these "islands" down the river that they stranded on the banks near Buenos Aires and thus constituted a public menace. Thousands of snakes, with an occasional wild boar or other animal which had become marooned, went ashore into the thickets between Palermo Park and the river, and a large force of policemen armed with machetes had to be put to work killing them.

A LAKE OF MYTHS AND LEGENDS

Just before noon we anchored offshore opposite the mouth of the Rio Corrientes, which flows in from the east, while a small tug delivered a few passengers from the small town of Esquina, whose orange groves and bright green fields showed in the middle distance.

The Rio Corrientes helps to drain the

Photograph by William R. Barbour

THE SON OF A PARAGUAYAN GAUCHO

Like his father, he is an adept at handling the flat-thonged *revenca,* the native whip, whose sharp voice is worse than its stroke.

mysterious Lake Iberá (Gran Laguna del Iberá), a great unexplored body of water in the interior of the province of Corrientes. The lonely recesses of this lake are rendered inaccessible by the floating vegetation, which covers the water and is said to form floating islands on which live tribes of Indians. All sorts of myths are current regarding the region and few inhabitants of the province are bold enough to enter it. It is a traditional haunt of evil spirits in the form of Indians whose feet have heels both before and behind! The Argentine Government is planning to have the lake explored by airplane.

During the second afternoon palms became more numerous and the forests still more tropical in aspect. One tall tree, with dense foliage and pale, almost white, bark was the *tala,* a cousin of our American hackberry. There were also many *ceiba* trees covered with orange-pink blossoms.

PASSING THE VAST, UNEXPLORED CHACO

By the third morning the territory of the Chaco lay to the west of us, its largely unexplored swamps and jungles covering an area of at least 200,000 square miles, in northern Argentina, western Paraguay, and southeastern Bolivia. Were it not the home of the *quebracho,* that tree which is so important a source of tannin, the region would be even less known than it is.

In the forenoon we reached Corrientes, capital of the province of the same name. It is a typically Spanish-looking, sleepy old place, with its one-storied whitewashed brick homes showing only blank walls to the narrow, filthy, roughly cobbled streets.

Immediately above the city the river is very wide, but, thanks to high water, we were able to stay close to the west shore, behind a string of islands. Fresh-water gulls, small cranes, and large, dull-blue kingfishers vied for interest with the alligators basking on the sunny banks.

Soon we reached the confluence of the Paraná and Paraguay rivers, and continued up the latter. The "Alto Paraná," as it is called above the junction, comes in from the east and is a much larger river than the Paraguay, but less important, as it is shallow and hard to navigate and flows through a region which as yet has been little exploited. It forms the boundary between eastern Paraguay and Argentina as far as the Brazilian frontier, near which point is the famous Iguazú cataract, higher and wider than Niagara. To reach Iguazú, one transfers at Corrientes to a smaller steamer, which runs up the Alto Paraná, passing Posadas, the ancient Jesuit town in the semi-tropical territory of Misiones.

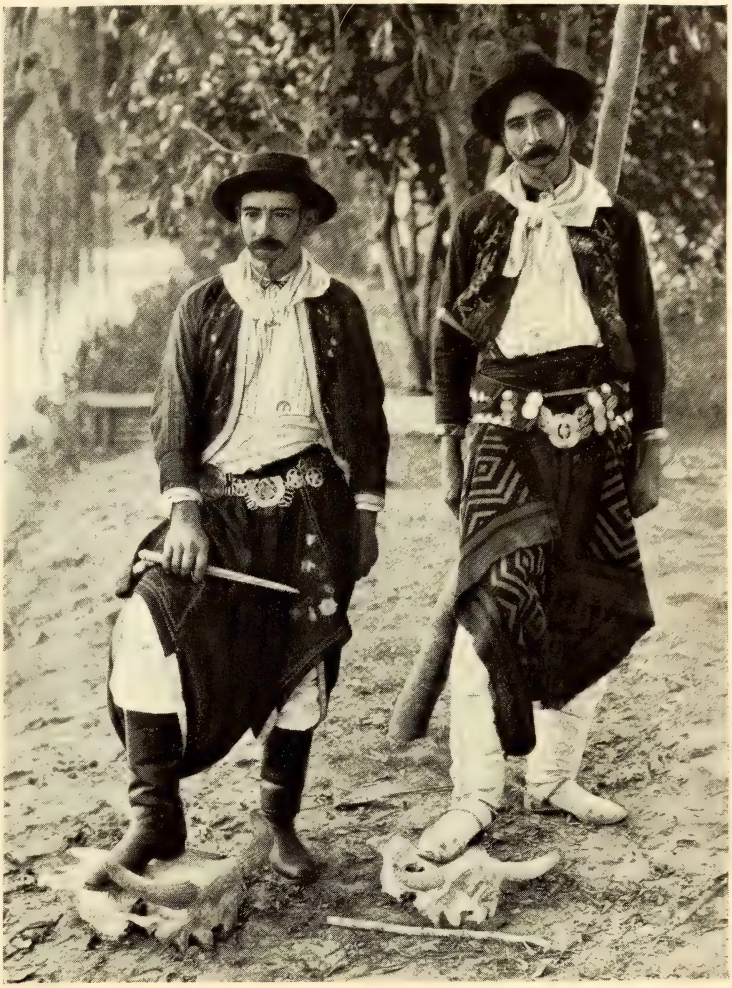
THE LAND OF PARAGUAY TEA

Down the Alto Paraná come lighters of cedar logs, cattle, and yerba maté, or Paraguay tea. This latter consists of the pulverized leaves of a scrubby species of ilex (holly). Though scarcely known on the European or American markets, it is universally used in South America, especially by the poorer classes. Nearly every one who tries it learns in time to like it, finding it slightly more stimulating than ordinary tea, and especially beneficial when used to counteract the ill effects of a meat diet.

The Jesuits cultivated yerba maté in great plantations in Misiones, but when they were expelled from the country, a hundred and fifty years ago, they took the secret with them; so that up to a few years ago the total supply came from the plants in the forests.

The first sight of Paraguay, which lay to our right from now on, revealed flooded islets and vast grassy prairies. Humaitá, the first Paraguayan town to which we came, is famous as the scene of an important battle between Paraguay and a coalition of her neighbors. The prominent feature of Humaitá is the imposing red-brick ruin of a great church, whose thick walls, arches, and tower survived the cannonading.

Surrounding the ruin is a beautiful velvety green parade ground, with low barracks behind. The streets of the town debouch on this parade ground, and they, too, are like green lawns—wide, quiet, old-worldy, with cows placidly



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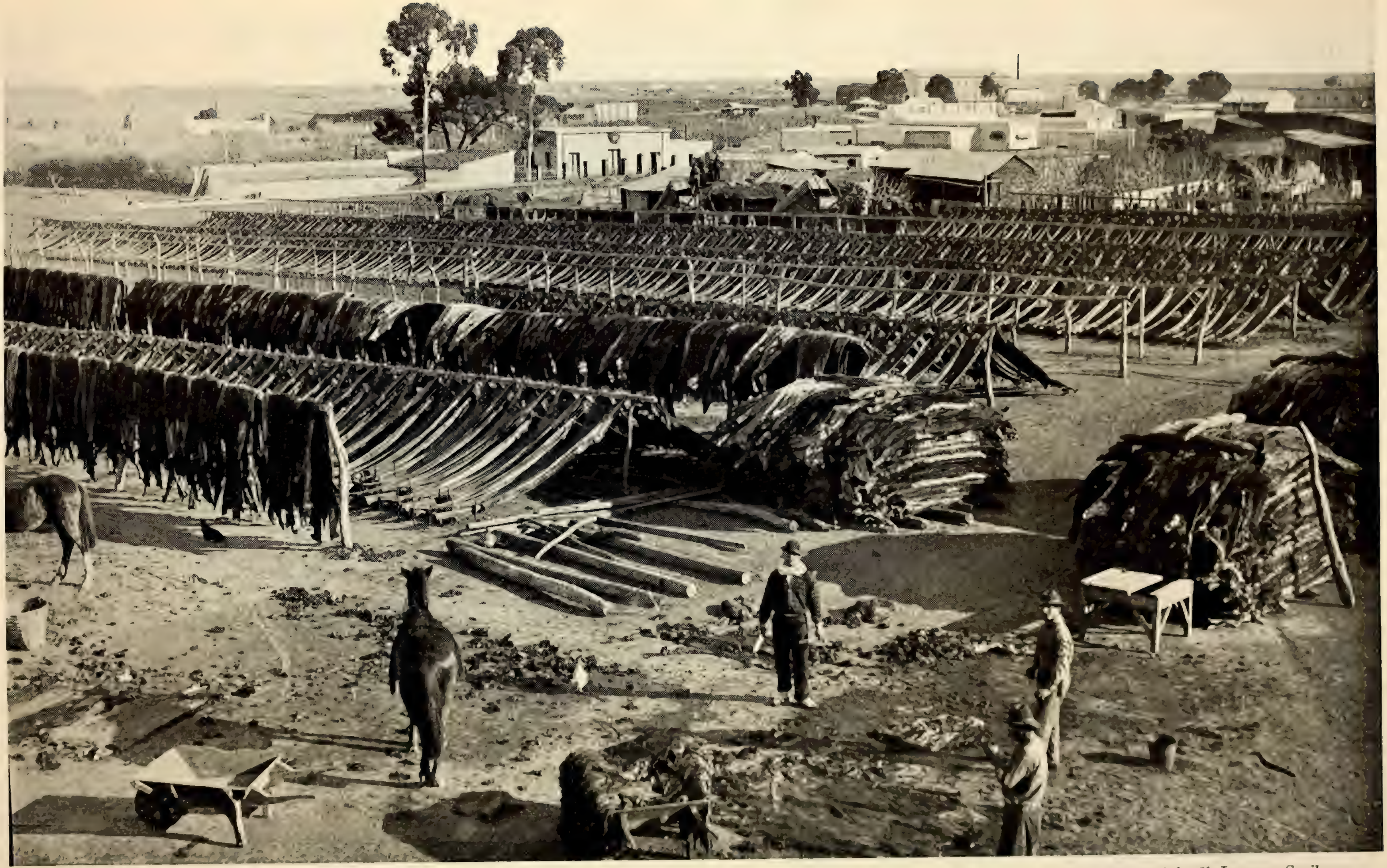
GAUCHO MINSTRELS IN PICTURESQUE GALA COSTUME

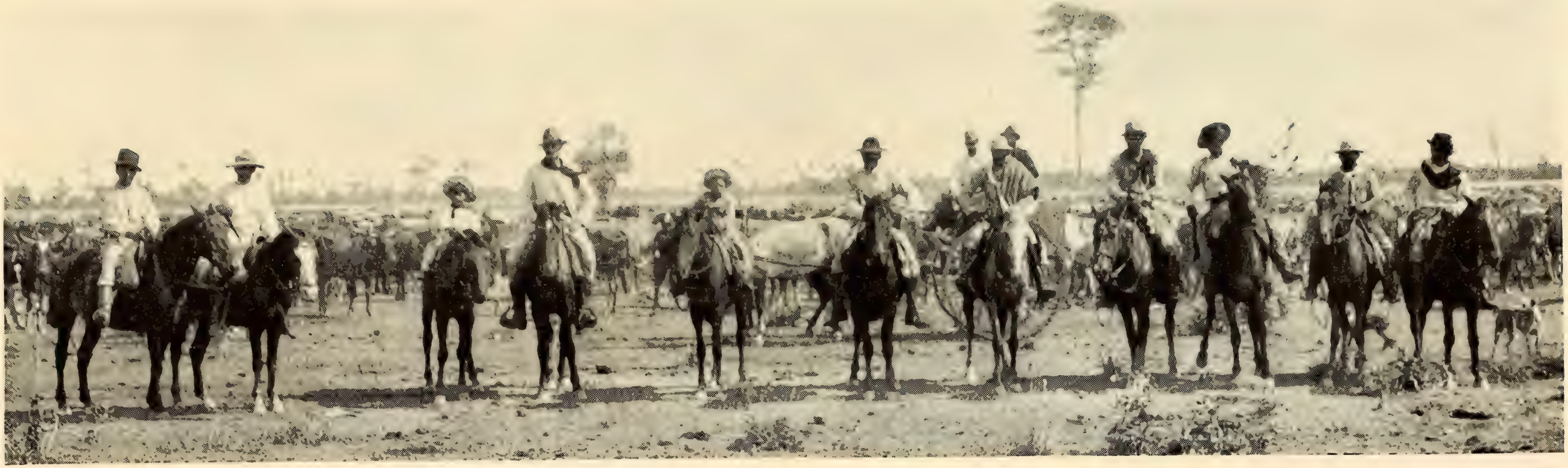
Utility is combined with showiness in the costume of the freedom-loving gaucho. To him it is more important that his *bombachos*, or wide trousers, shall be comfortable than that they be new. His soft, light boots are models of comfort, and his wide belt, heavily decorated with silver, is far easier on his body than one of narrow leather. His favorite musical instrument is a dreamy guitar (see illustration, page 385), but the love lyrics and adventurous ballads of a former age are already becoming more rare and his once ever-ready dagger is less frequently drawn. The cowboy of Argentina is, like his North American cowboy brother, becoming "civilized," and it may not be long before a starched collar takes the place of his picturesque neckerchief.



Photograph by F. Lamson Scribner

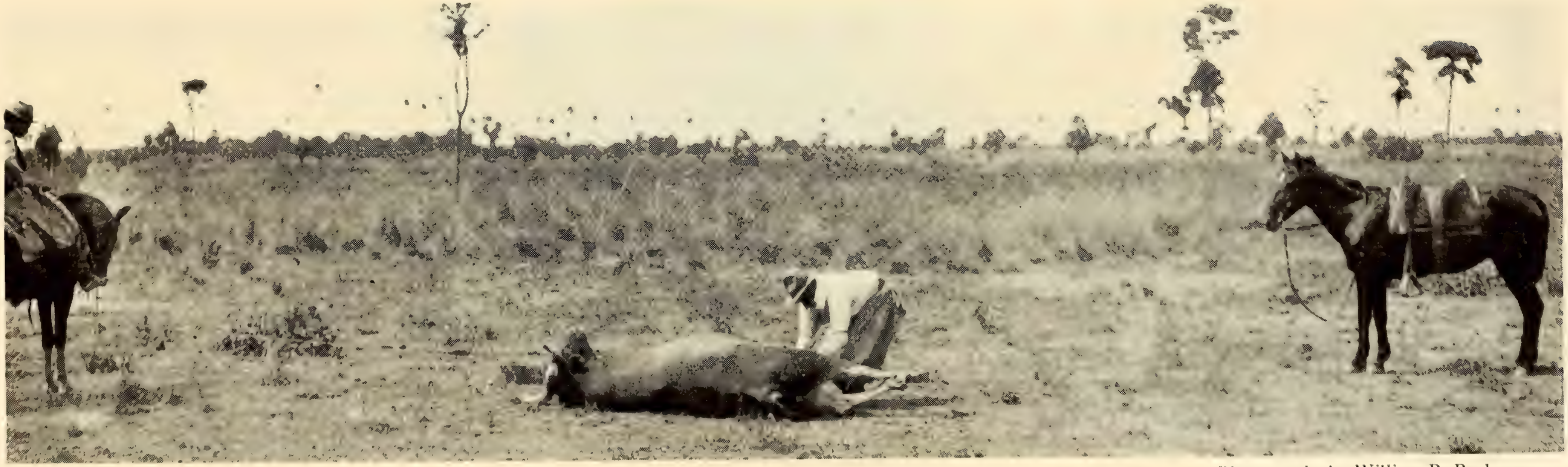
STRETCHING AND DRYING HIDES IN ARGENTINA

Argentina has the raw materials for a vast tanning industry. Not only does extensive stock-raising provide plenty of rawhides and pelts, but its quebracho forests provide the world's main source of tannin. Before the World War, large quantities of this timber were exported to Germany, and a single quebracho concern then employed 8,000 people and its lumbering operations extended over 2,000,000 acres.



A FORCE OF GAUCHOS WITH THEIR HERD IN THE BACKGROUND

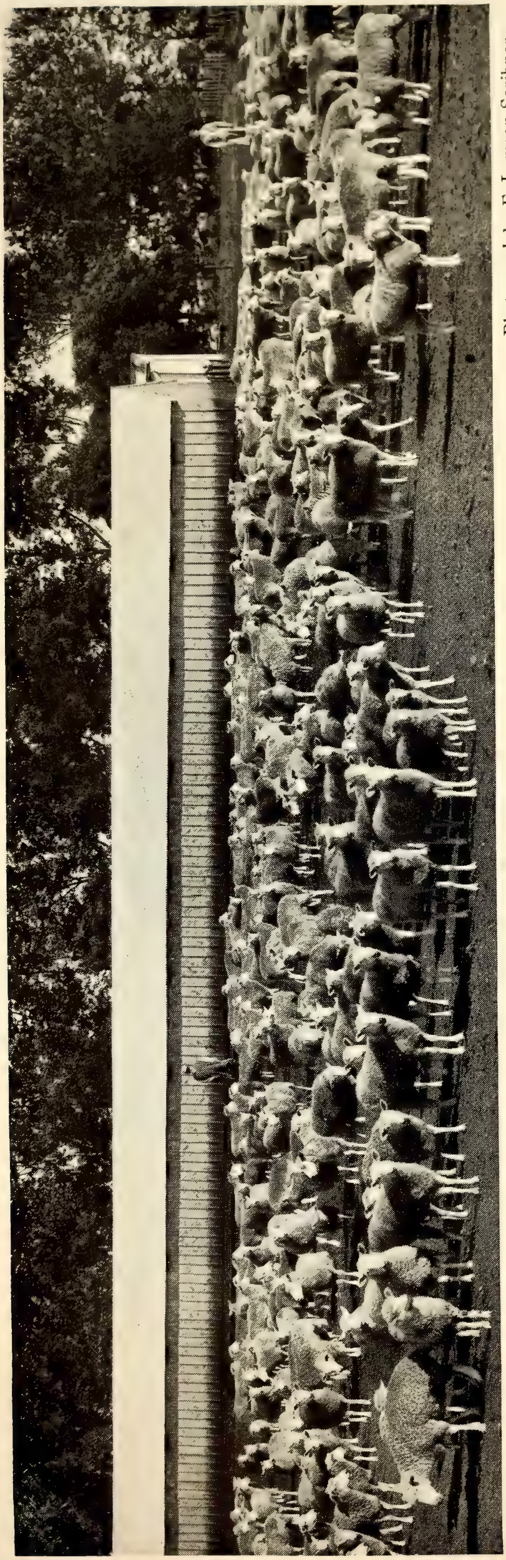
Cattle and not spectators are brought in to an Argentine round-up, or *rodeo*.



Photographs by William R. Barbour

THREE LASSOS WERE REQUIRED TO BRING DOWN THIS ANIMAL

Even the most refractory cattle are soon laid low by the skilful gaucho, whose eye is keen, whose nerve is steel, and whose hand is sure. The cowboy south of the Equator uses a lariat 72 feet or more in length, hand-braided from rawhide.



Photograph by F. Lamson Scribner

ONCE DESPISED, NOW AN IMPORTANT SOURCE OF REVENUE

Only Australia surpasses Argentina in sheep-raising, yet for many years mutton was despised by the South Americans, as the only valuable product of the sheep was supposed to be its wool. In 1794 the Merino breed was imported from Spain. Thirty years later Southdown stock was introduced. In 1844 the introduction of wire fencing greatly stimulated stock improvement.

grazing and an occasional small brown boy sauntering leisurely across. In the gardens are banana trees.

THE PILCOMAYO, A LONG UNCHARTED RIVER

Early on the fourth morning we passed Formosa, a town of some 3,000 people, the capital of the almost wholly unexplored Argentina territory of Formosa, which, with an area about the size of Pennsylvania, has a population of 19,000 people, most of whom live in a narrow belt along the river.

Formosa is administered by a territorial governor appointed by the President. In the interior are several forts, maintained for protection against the warlike Indians who inhabit the forests. Recently one of these forts was destroyed and its garrison massacred.

During the morning the mouth of the Rio Pilcomayo appeared on our left. Rising far away in the table-lands of Bolivia, near the famous silver mines of Potosí, it forms for hundreds of miles the boundary between Argentina and Paraguay, but has never been explored nor its course mapped. One hundred miles above the mouth, navigation on the Pilcomayo is stopped by a gigantic morass, two hundred miles long and fifty miles wide, in which the river entirely disappears.

Nearly opposite the mouth of the Pilcomayo is the Cerrito Lambaré, a rounded knoll which is separated from a similar small hill behind Montevideo by seven hundred miles of land nearly as flat as a table. Behind Lambaré the country rises northeastward toward low mountains in the blue distance.

Soon our course bent westward, and on a low hill to our right appeared a wireless tower, one of several recently erected by the Paraguayan Government. Then a bend to the north, past a brewery high on a wooded bank, and to the east lay our destination, the old, old city of Asunción.

Sloping gently up from the busy docks and custom-house, or *aduana,* the white, tan, and pink tinted walls of the houses, the old red tile roofs, and the green of parks and plazas presented an attractive picture, even with the thermometer 110 degrees in the shade.

Having passed the perfunctory formalities of the customs officers, we took a taxi to the Hotel Cosmos, and so were introduced to Paraguayan currency. The Paraguayan dollar, or *peso,* at the time of our visit was worth about four cents. As the same dollar-mark is used as in the United States, the money is startling at first, with cigarettes at $3.00 per pack, a short taxi ride costing $15.00, and the rate per day at the hotel $80.00.

Paraguay has no gold reserve, and the value of her currency fluctuates from day to day with the stability of the government. The value of the paper peso has been as low as one cent in the past.

A FLOURISHING CITY BEFORE THE PILGRIMS LANDED

What a feeling of age there is about Asunción! Founded nearly four centuries ago, it was a flourishing city, the capital of a vast region, generations before the Pilgrims landed. And the stirring events: Spanish intrigues, the Inquisition, the rise and fall of the Jesuit power, the final overthrow of the Spanish rule, and then tyrants, dictators, revolutions, wars with Argentina and Brazil, continual turmoil and confusion! The last revolution occurred only a few years ago. Trouble and bloodshed are in the very cobblestones of the streets, which, laid long ago, have run red many a time.

Of course, there are modern touches. A few automobiles bump over the rough cobbles; there are moving pictures and street-cars, and ugly corrugated iron is beginning to take the place of the picturesque lichen-stained red tiles. But they have very little effect on the general atmosphere of the place.

An especially beautiful touch of rich color is lent to the city in the early summer by the *flamboyante* trees, whose dark, glossy foliage is almost concealed under masses of vivid scarlet blooms. These trees may be seen in *patios,* leaning over whitewashed walls, and often in rows along the sidewalks. There is also another tree, a species of guava, covered with golden yellow flowers.

During the hot months, work hours start very early. Even at 5 o'clock in the morning the town is wide awake: peons in white, with large straw hats, slouch leisurely along; black-clad women, with black mantillas over their heads, hurry home from mass, and native carts begin to rumble along the rough streets.

Soon after mid-forenoon all industry stops and for several hours the city seems deserted.

THE MALE POPULATION WAS ALMOST EXTERMINATED

All the common people are barefooted, the men smoking cigarettes and most of the women puffing on short black cigars, which are so strong that even a veteran foreign smoker usually acknowledges himself vanquished when he first tries them. Oddly enough, the native cigarettes are unusually mild.

When the bloody war with Argentina and Brazil finally ended, the male population of Paraguay, after years of heroic resistance against overwhelming odds, was nearly exterminated. It is said that as late as a generation ago there were twelve Paraguayan women for every man, and even now the ratio is three to one. Men in Paraguay are precious and, as a consequence, are not, as a rule, fond of exertion. American meat-canning factories in the country report that almost all their employees are women. The only work in the factories which is done by men is cutting up the carcasses.

A large majority of Paraguayans have a percentage of Guaraní Indian blood, which shows in the dark complexions, slightly flattened noses, and straight black hair of the people. When the first Spanish explorers came, the Guaranís occupied the fluvial portions of northern Argentina and Paraguay, and hence were the first to be subjugated.

Today the Guaranís do not exist as a

© Keystone View Co.

A HUMBLE INHABITANT OF THE RICH CÓRDOBA REGION OF ARGENTINA

This child of the lower classes, mounted on a donkey, is returning from a slaughter-house with the skull of a steer in one of the two crude pack baskets which hang from the donkey's sides. Córdoba is the capital of one of Argentina's richest provinces. Its drinking water, light, and electric power come from the Rio Primero, which is held back by one of the largest dams in South America, at a point 12 miles above the city.

separate people, the tribes in the interior being of a different stock and tongue; but the Guaraní language has held its own through the centuries and still is spoken by the lower classes quite as generally as Spanish. It is a primitive dialect, with a vocabulary of less than eight hundred words and only rudimentary grammar. Four is as high as one can count, after which one says "full hand," "full hand and one," etc. Most of the geographical names of Paraguay are Guaraní and a majority of the common names of trees, plants, wild animals, and birds are in that language.

From Asunción a line of small steamers runs on spasmodic schedules up the Paraguay River far into Brazil. Our boat proved to be a filthy little side-wheel tub of six-foot draft, mostly patronized by third-class passengers, who swarmed over the lower deck, drinking maté, smoking, and chattering Guaraní like a troop of monkeys. It was very hot and mosquitoes were numerous. After passing Villa Hayes, named in honor of President Hayes, of the United States, following his decision of a boundary dispute with Argentina in favor of Paraguay, we made our first stop at a high bank to take on passengers from Rosario, a town several miles inland.

THE PARAGUAYAN GAUCHO IN HIS GLORY

Here we first saw the Paraguayan gaucho in all his glory. His shirt is bright-colored and about his neck is loosely knotted a gorgeous silk handkerchief. Tight-fitting white cotton trousers, often with draw-strings at the ankles, extend almost to his armpits. About his waist he girds a six-inch-broad leather

Photograph by William R. Barbour

BEEF EXTRACT STILL ON THE HOOF

Frozen and chilled beef lead the list of Argentine exports, much of the meat being converted into beef extract. There are more than six head of cattle for every inhabitant. About half of the animals are of native breeds and the rest cross-bred with thoroughbred imported stock. Fully one-half of Argentina's 750,000,000 acres is adapted to stock-raising.

belt, to which are sewed little leather pockets, useful for carrying money, cigarettes, and other small personal belongings. Always the belt supports the sheath of a long knife.

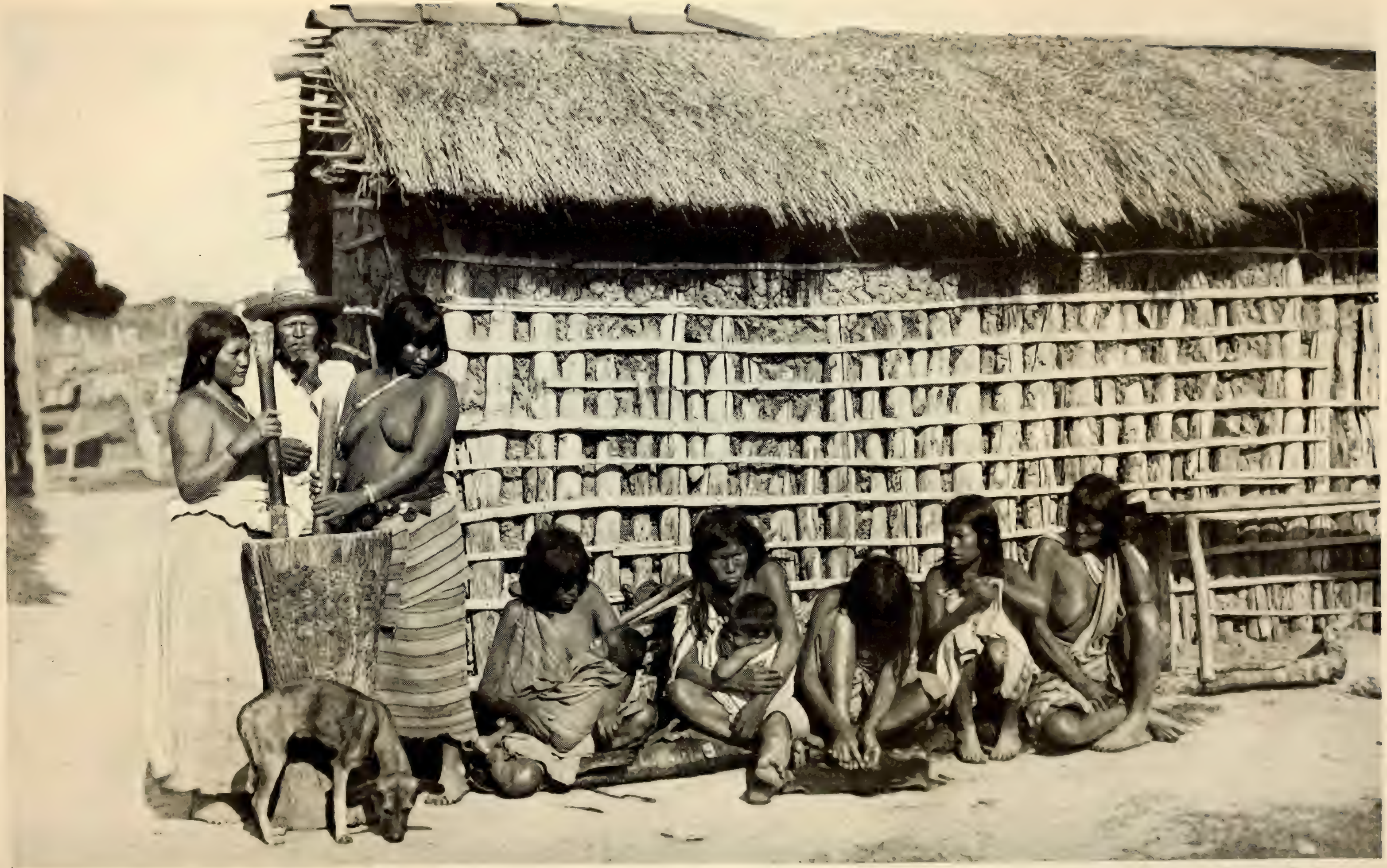
Though barefooted, he wears spurs and sometimes loose leather leggings. A fringed apron of soft-tanned brown leather hangs to his knees, its purpose being to protect him when on horseback from thorns and from the pressure of his lasso. Usually he carries a silver-handled, flat-thonged native riding whip, or *revenca.*

PARAGUAY'S GRINNING, BLOODTHIRSTY FISH

When the boat stopped long at landings, we whiled away the time fishing off the stern. Three species of fish are common in the Alto Paraguay. The *pacú* is a fish resembling a bass, which attains a weight of several pounds, and is very good eating. The *armado* is like a catfish, but bears bony back plates like a sturgeon. It grows to be several feet long and is eatable, though soft and tasteless.

But the most interesting fish of the three is the *piranha,* which reaches a length of only six or eight inches and is built like a sun-perch. Its jaws are armed with a most extraordinary set of teeth, keenly sharp, which mesh like the teeth of a steel trap. They project in such a way as to give the creature's mouth the effect of a fixed grin.

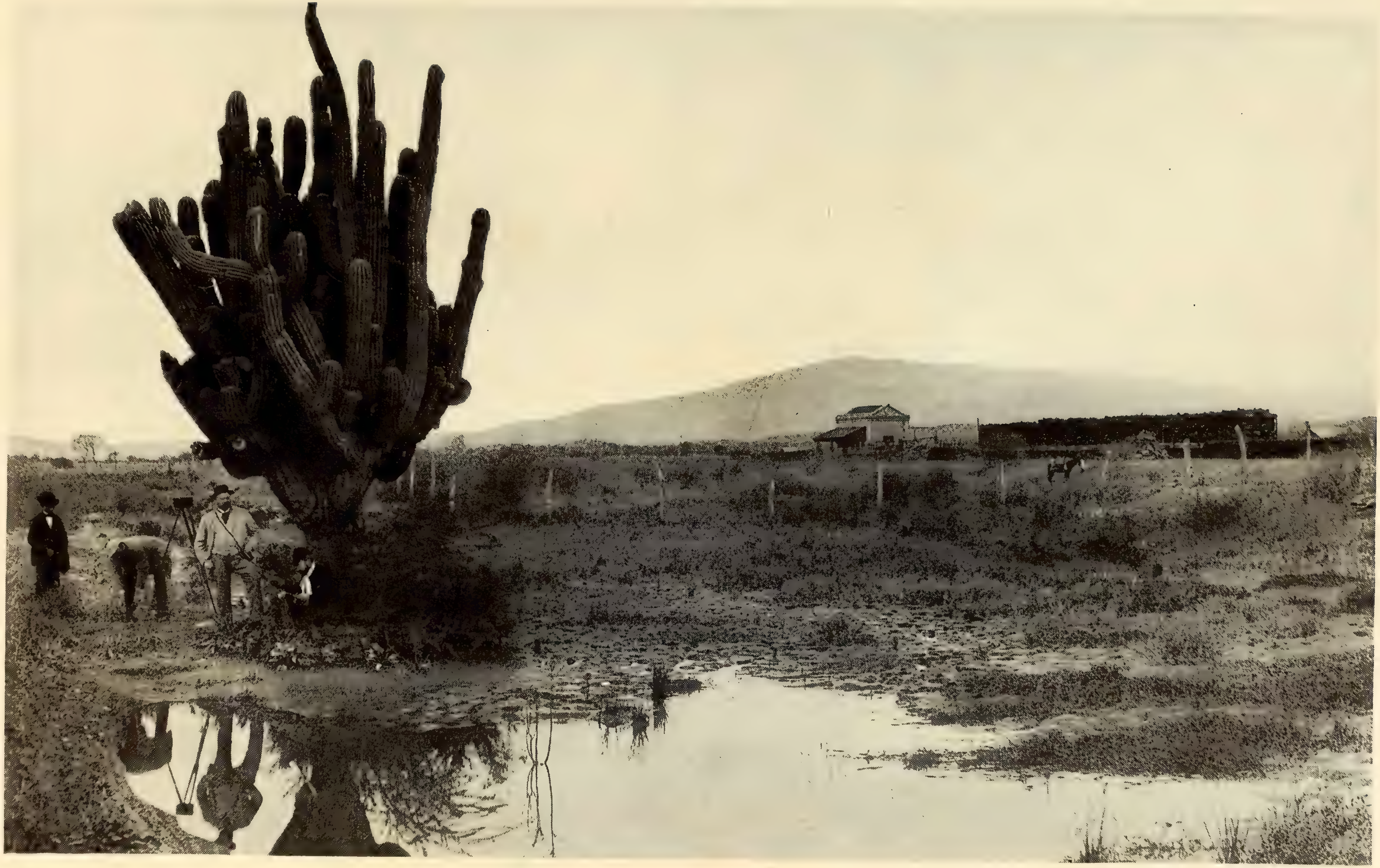
Piranhas are found in immense quantities in all the streams of northern Paraguay and are ravenous for blood. If a wounded animal or person falls in the water, they appear in great swarms and in a few moments leave nothing but a skeleton. Often they leap clear of the water, and one can hear their teeth clash thirty feet away. Caught and pulled on deck, they squeak with rage like a cornered rat. Bathing is *not* a popular sport in Paraguay, and in some sections it is even unsafe to wash one's hands in the streams. Because of the *piranhas,* in



Photograph from F. Lamson Scribner

INDIANS OF THE LITTLE-EXPLORED ARGENTINE CHACO

Dark glades where venomous serpents wait, impassable swamps, and Indian ambush have prevented thorough exploration. The Chaco Indians were until recently given to scalping their enemies and using the skulls as drinking vessels; but gradually they are taking up the modern tasks of harvesting sugar-cane and cutting quebracho timber.



Photograph by F. Lamson Scribner

A GIANT CACTUS OF ARGENTINA

Not often does one find cacti of the arid regions reflected in a placid pool.

PASSENGERS BOARDING A RIVER STEAMER ON THE UPPER PARAGUAY

Photographs by William R. Barbour

COUNTING THE FUEL OF AN UP-RIVER STEAMER

Above Asunción, wood is the only fuel, and the unit of measurement is a stick averaging 11 pounds in weight. Counting fuel takes time, and although the Paraguayan does not mind this, the impatient foreigner is thankful that the fuel to be counted by hand is not nut coal.

Photograph by William R. Barbour

WHEN THE STEAMER ARRIVES AT FORMOSA, ON THE PARAGUAY, THE WHOLE TOWN TURNS OUT

The large white "M" on the funnels of most of Argentina's river steamers stands for romance. Nicolás Mihanovich, a poor lad from Austria, began his career in Buenos Aires 40 years ago by carrying passengers from shore to steamer and back, as did Cornelius Vanderbilt from Staten Island to Manhattan. When he died recently, he owned some 250 steamers operating on the Rio de la Plata (River of Silver) and its tributaries.

fishing for *pacú* and *armado* one uses a half orange for bait.

About sunset, when the heat of the day had worn off, the river was beautiful. As our ship slipped quietly around the great bends, whose low shores, usually wooded, sometimes revealed a palm-dotted plain or lonely native hut in a grove of bananas, we took great delight in watching the bird life. There were numberless ducks and gulls, white-headed black cormorants, which the natives called *mbi-guá,* and many specimens of the great gray heron, *garza mora,* a cousin of the dainty white *garza blanca,* which has been hunted for its aigrette plumes till it is nearly extinct.

The next morning we reached the Tropic of Capricorn and stopped at the old town of Concepción. It was intensely hot, but a few of us went ashore to the Hotel Francés, a neat little hostelry run by a French couple. Their *patio* was as pretty and restful a place as one could ask for, with an old-fashioned well under a blooming *flamboyante* tree and beautiful flowering shrubs and plants in pots and tubs. Just above Concepción are an American-owned quebracho extract plant and a meat-canning factory, whose employees maintain an American club in the town.

For a few miles above Concepción the river is dangerous, with shallow, rocky bottom and treacherous, twisting currents. We went through at half speed, the leadsmen continually trying the depth. Constantly on this trip I was reminded of Mark Twain's "Life on the Mississippi."

By morning we had passed Puerto Pinasco and San Salvador, and the country had changed in character. Low, wooded, limestone hills appeared on the right and high cliffs and grottos. To the left, the Chaco swamps remained as before.

The geology of this section is interesting. The Chaco was once a shallow inland sea, with its eastern border about where the river now flows. This sea eventually dried up, leaving vast swamps, with a salty or alkaline grayish sandy soil devoid of rocks. The river is today the

Photograph by William R. Barbour

THE RIVERSIDE CUSTOM-HOUSE AT ASUNCIÓN, PARAGUAY, SUGGESTS THE ENTRANCE TO A VENETIAN HOTEL

Agricultural machinery, fence wire, railway supplies, and coal enter free of duty here. The average time of mail delivery between New York and Asunción is 37 days. A depth of 10½ feet of water is available on the Rio de la Plata, the Paraná, and the Paraguay throughout the year, although Asunción is 1,150 miles inland.

dividing line, even the plant and animal life differing on its two sides. I was told that a few miles east of the river the country consists of high rolling hills clad with open forests of cedar and other valuable cabinet woods, and with running streams of clear water in the valleys.

Our destination was Puerto Casado, some three hundred miles north of Asunción and only a few miles below the Brazilian frontier. We reached it the next noon, leaving our ship to plow on several hundred miles farther, to its final stopping place at Corumbá, Brazil, and catching it again on its return trip.

ONE FAMILY OWNS SEVEN MILLION ACRES OF LAND

Puerto Casado is the site of an old extract plant, small sawmill, and town of employees. The entire establishment, with seven million acres of wild land, extending across the Chaco to the Bolivian frontier, belongs to one Argentine famly.

We were made welcome by the major-domo and his assistants, including a Swiss, a German, an Italian, and a Japanese, all living together in peace and harmony and only too glad to do all they could for their infrequent visitors. They told me I was the first American who had ever visited Puerto Casado.

To supply the extract plant with quebracho logs, a thirty-inch gauge logging road has been built due west into the jungle. A canvas-covered railway motor car was put at our disposal, and we made several trips to the end of the line.

While most of the quebracho had been cut, a dense forest of other trees remained, with an impenetrable understory of cacti, thorns, and trailing vines.

Occasionally we passed small open spots, along the edges of which the curious tree called *palo borracho* was always conspicuous. It has the shape of a long tenpin or round-bellied bottle, with almost white bark studded with great green thorns. The wood is soft and spongy and the trunks are often used by the Indians for dugout canoes, to which purpose the shape lends itself admirably. Its flowers resemble yellow lilies and are followed by pods or bolls of a cottony substance.

Another common Chaco tree is *palo santo,* whose aromatic, spicy wood smells like an old-fashioned rose jar. In many native houses this wood is the favorite fuel, for it gives off a pungent smoke which is said to drive away mosquitoes.

Birds were all about us: white-tailed vultures, reddish-winged hawks, Paraguayan quail, long-tailed blackbirds, noisy green parrots, tiny jewel-bright hummingbirds, and small, pure white sparrows, which the natives call *monjas* (nuns).

In open swampy sites wild cannas, both red and yellow, grew by thousands. On the limbs of the trees were many kinds of orchids. The cactus was blooming in white, crimson, and yellow, some of the flowers being as large as dinner plates.

SOME INDIAN TRIBES ARE STILL HOSTILE

Near the end of the line was a small settlement of Indians. They were living in rude, brush-covered shelters and sleeping in hammocks which they wove from the fibers of cactus. The adults of both sexes wore cloths doubled about their hips, supported by thongs over their shoulders.

These Indians had become semi-civilized by occasionally associating with the whites, and once in a while they could be induced to work for a few days. Three other tribes—the Lenguas, Suhins, and Savapanas—live farther to the south and have been nominally converted to Christianity by several Episcopal missions established in the Chaco years ago. The Tobas, who live in the great swamps up the Pilcomayo River, and the Matacos, who roam the unexplored hinterland of northwest Paraguay, are still wild and fierce savages, who have destroyed or driven back the few expeditions which have sought to invade their territory.

Beyond the end of the logging railroad, only thirty miles west of the river, all is unknown country. Nearly four hundred years ago a little band of Spaniards, traveling northwest from a point near Concepción, after untold hardships, reached the settlements in Bolivia; but, so far as is known, the feat has not been duplicated.

Some historians believe that the last remnants of the Incas escaped through Bolivia into the Chaco. At least there are tribes to be studied whose very existence is little more than hearsay, and traditions of strange beasts to be investigated, such as the great dog-headed snake which the Indians firmly believe lives in the deep fens. What a virgin field for exploration and research!

A Scandinavian cattle foreman named Knutson had invited me to accompany him to a cattle round-up, or *rodeo,* some seventy-five miles west of the river; so, after my visit to Puerto Casado, I went on down the river to Puerto Pinasco and joined him. A narrow-gauge logging road extended westward through the Chaco some thirty-five miles; so we loaded our native ponies and saddles on a car, glad of any chance to avoid horseback work with the mercury so near the top of the thermometer.

For a few leagues west of Puerto Pinasco extend plains scattered with palms and *paratodo* trees, whose thick, deeply ridged bark is used locally in lieu of quinine in fighting *chu-chu* fever.

West of this belt of open country the forests begin, and, interspersed with small prairies, extend to the end of the road, near which we found a logging camp. All the buildings were made of the trunks of palms, even the roofs being half trunks gouged out and laid alternately concave and convex.

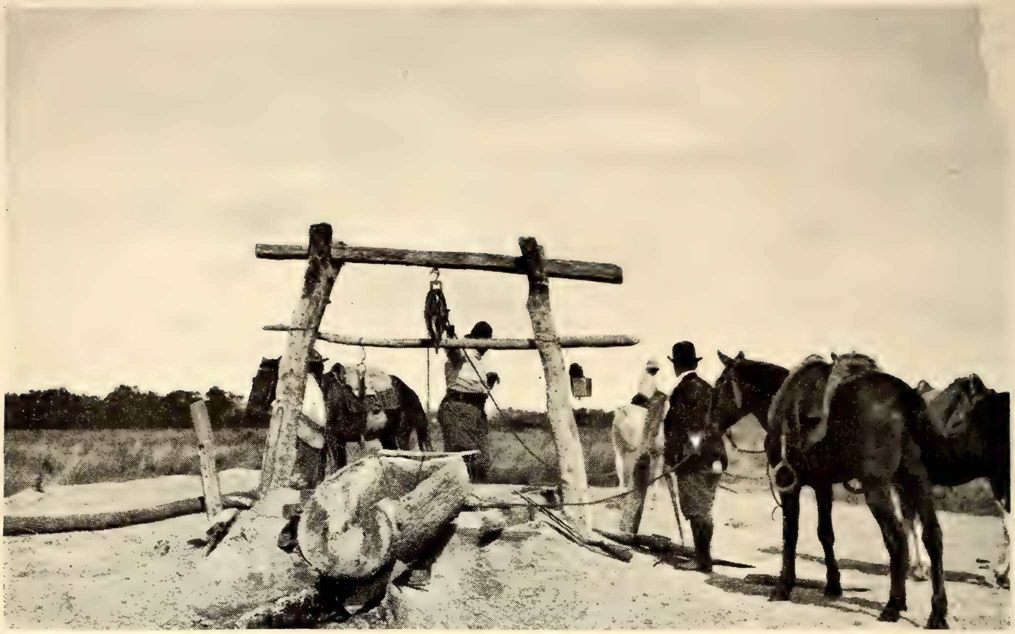
It was about noon of an intensely hot day when we reached the end of the railway and started on our long horseback ride.

A GAUCHO DANCE AND A GAUCHO ORCHESTRA

About mid-afternoon we reached a camp of gauchos and found a dance in progress. An arbor of palm poles, thatched with rushes, had been built adjoining the covered passageway between two huts, and the earthen dancing floor beneath it was beaten almost as smooth and hard as rock.

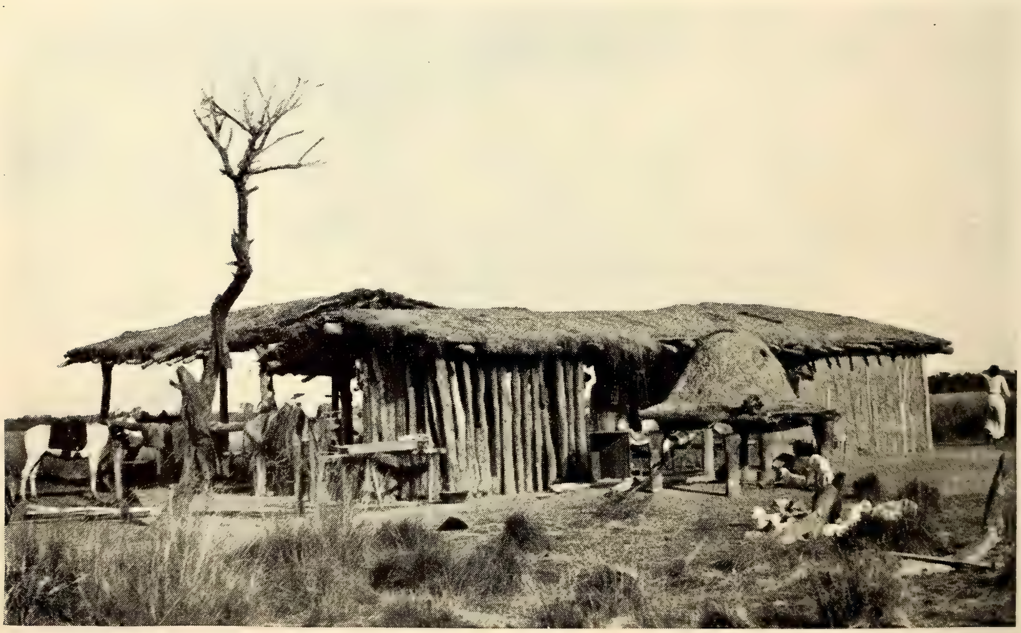
The orchestra consisted of a small violin, two Paraguayan guitars, and a most peculiar harp with a wooden coffin-shaped base. The slow music, with many grace notes and runs on the harp, had a weird beauty to it that was most attractive.

A native round dance, called Santa Fé, was in progress. At intervals one couple would appear in the center of a ring of other dancers, and after a few waltz steps would face each other and go through a



A NATIVE WELL IN THE ARGENTINE CHACO

With an area larger than that of New York State, the Argentine section of the Chaco has a population less than that of Ithaca. A vast plain dotted with lagoons fills the northern part, dense forests lie farther south, and everywhere is to be found the valuable quebracho tree (see also page 414). Swamps, wild beasts, hostile Indians, and miasmatic glades are slowy surrendering before the advance of the colonist.



Photographs by William R. Barbour

A PIONEER'S ABODE IN THE FORBIDDING NORTHLAND OF ARGENTINA

Beside the house is a native oven, built of clay and raised on a platform. A fire is built inside, and removed when the interior is hot. The bread is then put in, all openings are stopped up, and it bakes perfectly.

plicated series of advances and re- ts, while the other dancers clapped ir hands in a syncopated time.

All the dancers of both sexes were arefooted. The women were dressed in hapeless cotton gowns, high-necked and usually dark-colored. All wore many strings of beads and had their high-piled hair fastened with great, clumsy combs. Most of them were smoking the short, fat Paraguayan cigars.

The men were more gaudily decked out, with extremely tight-fitting and high-waisted white trousers ornamented with big pearl buttons; horn-handled knives and long-barreled revolvers stuck through their broad belts; and bright-colored shirts and neckerchiefs.

While others danced, some of the guests were refreshing themselves with maté, coffee, *caña* (Paraguayan rum), native wine, biscuits, and cheese, all of which were spread out in abundance. The dance had started the night before and (we heard later) did not break up until the following morning.

West of this gaucho village the country changed for the better. We had passed the swampy zone, and while the forests and palm-dotted prairies still alternated, the open areas were larger. Soon the country became gently rolling, with beautiful pasture lands, where the grass brushed our stirrups. Occasionally we passed a small pond black with ducks, and twice forded small streams. I have seldom seen a more attractive country.

A PARAGUAYAN RANCH-HOUSE

As the sun sank, it became pleasantly cool, and I was almost sorry when, about dark, we reached the ranch which was our destination.

This ranch was the last outpost of civilization, and withal a comfortable and pleasant place. Two separate houses, built of palm, with a vine-covered *patio* between, and several employees' huts lay close to the sturdy palm-trunk fence of the corral. The rooms of the ranch-house were dark and cool, with hard dirt floors.

I was given a cot protected from mosquitoes by a thin cloth mosquito net. At daybreak a peon would come shuffling in with a gourd of hot maté and would bring several more while I dressed. It was always comfortably cool in the early mornings.

For a couple of days I hunted the big Paraguayan deer with Antonio, an old Indian, for a guide. He had been chief of a tribe, but had retired in favor of his son, and now lived in a brush shelter near the ranch-house. A few weeks before, there had been an uprising in his tribe, which lived somewhere in the unexplored country to the west, and Antonio had been compelled to go on the warpath. On his return he reported that he had caught the ringleader, tied him to a tree, and broken both his jaws with a club, as a hint to keep the peace thereafter.

Around the ranch Antonio wore a semi-civilized garb, but at home he wore only a sack, as did his two wives. His children wore the same costume—minus the sack.

A PARADISE FOR CATTLE

The great round-up was to be held thirty miles farther west, on Christmas eve; so by daylight Knutson and I had our coffee and biscuits and were on our way. It was a glorious morning, our animals were feeling fit, and I have seldom enjoyed a more splendid ride, loping across the wild plains, now skirting marshes, now crossing rolling hillocks. The tall grass on either side stretched to the horizon, except where low, dark belts of forests intervened. We twice forded a fair-sized stream, to whose source, so I was told, no white man had ever penetrated.

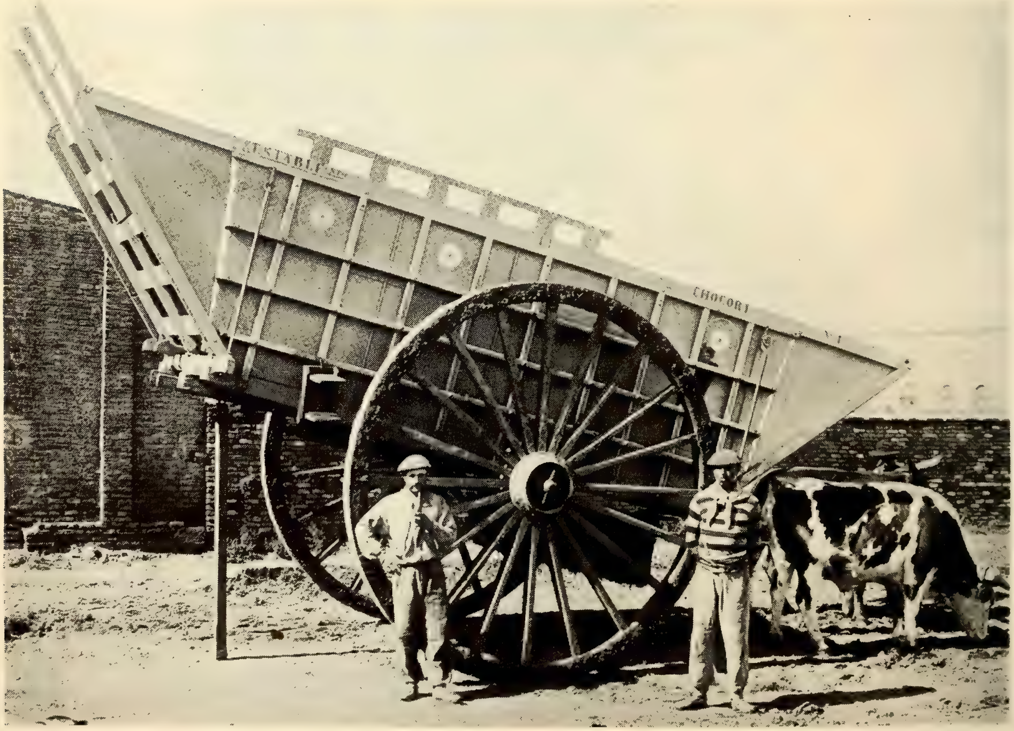
On our way we met a small band of Indians on the march, the chief in the lead, the other men, armed with long bows and arrows, following him in single file, while the heavily burdened squaws and several small papooses brought up the rear.

Knutson told me these Indians are nomads, moving their camp every few days. Little is known of their life and customs. It is believed that they worship the moon and ghosts and spirits. They will never camp where an Indian has died and they avoid many spots which would appear to be suitable camping sites, but which for some reason are taboo.

These Indians live chiefly on meat, wild roots, and fruits. They make an intoxicating drink from the fruit of the

Photograph by William R. Barbour

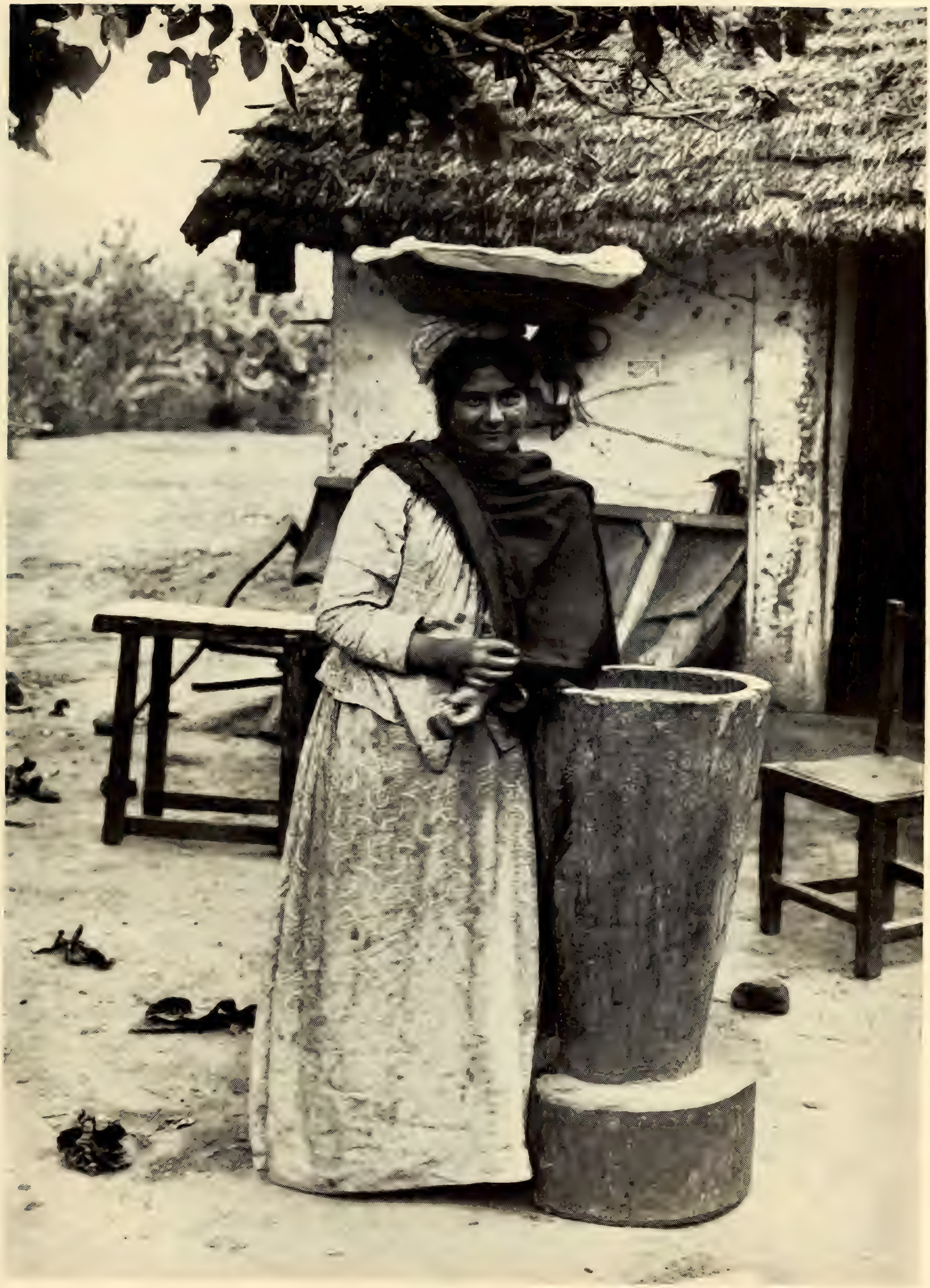
A HOUSEHOLD IN THE NONDESCRIPT RIVER PORT OF CORRIENTES



Photograph from Frederick J. Haskin

A BIG ARGUMENT FOR GOOD ROADS IN ARGENTINA

The country roads are often muddy and full of ruts, and eight-foot wheels are necessary to navigate the almost bottomless highways. Seven or eight horses harnessed abreast or three or four yokes of oxen are required to draw such skyscraper carts when heavy rains turn the level roads into sloughs of despond.



Photograph from F. Lamson Scribner

A NATIVE WOMAN OF ARGENTINA

The eight and a half million people of Argentina are of many races besides the native stock. Colonization has been rather slow, but Italians, Spaniards, French, Russians, Austrians, Syrians, Germans, Britons, Swiss, Portuguese, and North Americans have all answered the call of unoccupied acres in a new land.

algarroba tree, which resembles a locust pod. The method of manufacture does not sound attractive, as the squaws masticate the beans and expectorate them into an earthen vessel, where the mixture is allowed to ferment in the sun.

TEN THOUSAND CATTLE IN THE ROUND-UP

We found the scene of the *rodeo* to be an open plain with a brushy-banked creek looping about two sides of it. *Rodeos* had been held here for several years, and the grass was worn away over many acres. Here we were joined by Knutson's assistant foreman, a Paraguayan, and the latter's six-year-old son, a most interesting little chap. During the *rodeo* he "rode herd" assiduously, his shrill treble ringing out wherever things were most exciting. Only a few weeks before, when his father had been thrown from his horse and was about to be gored by an angry cow, the boy had saved the man's life by rushing his horse so fiercely against the cow's flank as to knock it completely off its feet.

A few gauchos were already on hand, guarding some two thousand cattle which had been driven in from the south the night before. Soon, far in the distance we could see a great cloud of dust rising, and we knew that the main herd was approaching. The pillar of dust grew nearer and larger, until at length we could spy the first of the cattle and hear the gauchos in the rear whooping and yelling, as they urged the herd forward. Then we were in the midst of the dust, with wild long-horned cattle all around us.

It was an hour or more before the last of the herd arrived and was milled into a circle with the others, by which time the total number was nearly ten thousand.

The exhibition of lassoing which ensued was well worth the trip. Knutson claims that the gauchos excel the old-time American cowboys at the art of roping, as the latter had better-trained ponies, which enabled them to use a shorter rope, never over sixty feet.

These gauchos were using seventy-two-foot lassos, and the manner in which they noosed running calves, usually having to throw through narrow openings in the confused, constantly shifting mass of cattle, was marvelous.

The lassos were all hand-braided from rawhide and were slightly tapered, being heavier at the noose end. They are never oiled, as it would make them too limber, but sometimes, when a steer has been killed and cut open, the coiled lassos are held for a few moments inside the steaming body cavity, which serves to stiffen and preserve them.

As the calves were roped and dragged, stiff-legged and protesting, from the herd, the mother cows became frantic with rage. They will not bother a man on horseback, but will instantly attack one if on foot. A fat old bull which had been gored in a fight caused the most trouble, and finally had to be held down by three lassos, each with a cow pony straining at the end.

Finally all the cattle had been inspected, the gauchos drove them off in small bands, and soon the plain was deserted for another year. Knutson and I rode slowly back to the ranch and a much-belated lunch, and the next day returned to Puerto Pinasco through a hot, muggy rain. There I bade him farewell and embarked on the long journey down river to Asunción and Buenos Aires.

Notice of change of address of your Geographic Magazine *should be received in the office of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your December number, the Society should be notified of your new address not later than November first.*

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THROUGH THE HEART OF HINDUSTAN

A Teeming Highway Extending for Fifteen Hundred Miles, from the Khyber Pass to Calcutta

BY MAYNARD OWEN WILLIAMS

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THERE is nothing provincial about India's Main Street. Starting at the Khyber Pass, where the Afghan caravans weave a tenuous thread of trade between the frontier hills, it runs to Calcutta, where a goodly share of the world's shipping is idly swinging to the tides of the treacherous Hooghly.*

The railways which parallel its more than 1,500 miles, as they parallel many of our own best highways, have diverted much traffic from the open road and cooped it up like crated fowls in third-class cars. But the bullock-cart still rolls on and the motor-car has made its presence smelt from the northwest frontier province to Bengal.

The "broad road" of Kipling's lama and his adventurous chela, Kim, runs through one of the most thickly populated regions in the world. It is a plain road from beginning to end. From the mud fort of Jamrud to the docks at Kidderpore, this highway is a low way. It passes over the watershed between the Indus and the Ganges at an altitude of less than a thousand feet, and thence runs along with the Jumna or the Ganges to the alluvial delta in the midst of which Calcutta proudly reigns as queen.

To the left, throughout the length of the road, are the eternal hills, beyond which the snow wall of the world's mightiest mountains can sometimes be seen. To the right is the jumble of low hills which bear various names, but which, if the peninsula of India were slightly lowered, would form the irregular northern base of an arrow-shaped island, with its point at Cape Comorin, opposite Ceylon.

THROUGH A REGION OF RIVERS

Although Main Street runs through a region of rivers, let us not think of it as a garden land; for during much of the year it is dusty and dry and at no time does it have the lush loveliness which dots the hot southland with scenes of refreshing beauty. Throughout most of its length, irrigation has been developed to a high degree, and the farmer buys his water as he buys his soil.

From the arid furnace of Ali Masjid, in the Khyber, to the steamy Sundarbans, this road is deadly hot at times; yet ice formed in my tent-room in Lahore, and along the watershed between India's two most famous rivers the nights in winter can be bitter cold, even for those Mongolian peoples whose heavy costumes remind one of the Himalayan snows, whence they come.

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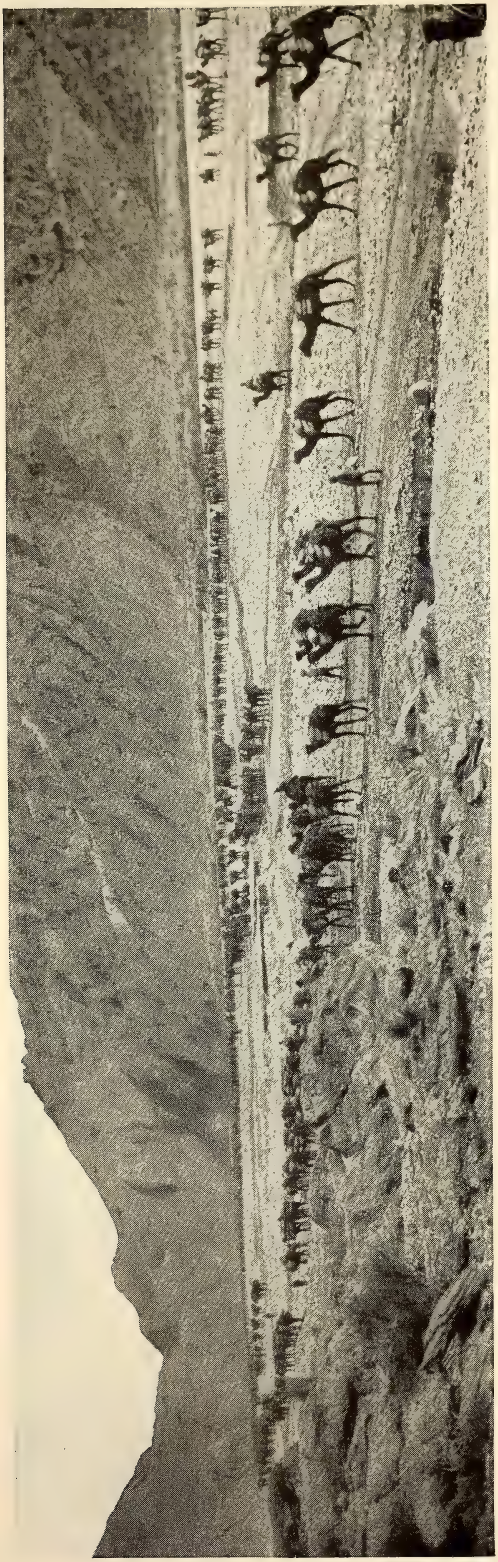
* For a map of India, see "The Map of Asia" (size, 28 x 36 inches), issued as a supplement with THE GEOGRAPHIC for May, 1921.



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A CAMEL COLUMN IN WAZIRISTAN

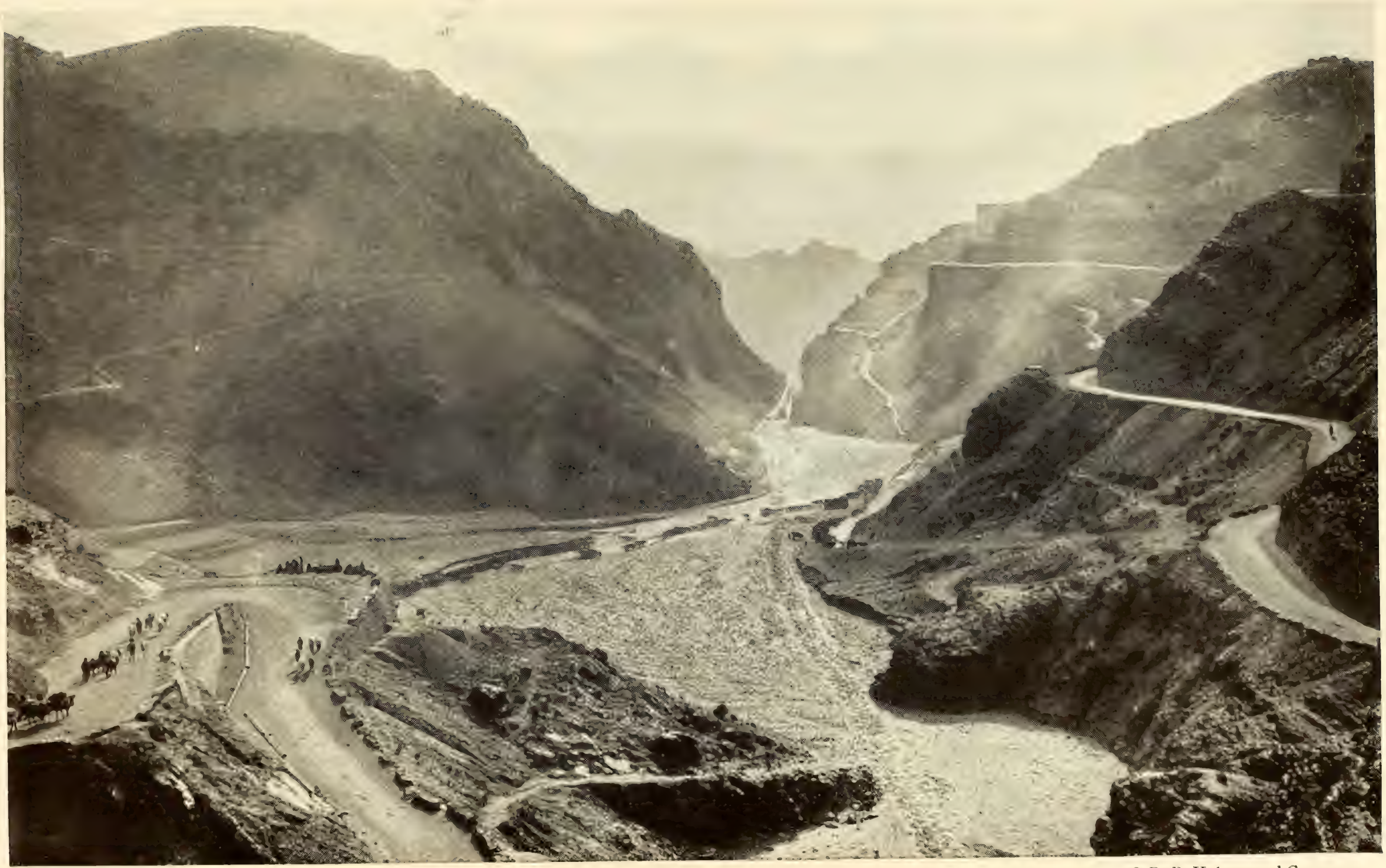
The Wazirs are the least tractable of the Pathan tribes south of the Khyber Pass. Here one sees the service of supply entering the Tank Zam Pass during a recent punitive expedition.

Main Street runs from the aridity of less than ten inches of rain annually, near the Afghan border, to the region of 75 inches, beside the lower Ganges; and were it to be continued farther, it would soak in the rains of Chittagong or Cherrapunji, where Jupiter Pluvius is always wringing out his heavy clouds like new washed towels and where in July, 1861, rain fell at the rate of one foot a day. Cherrapunji is accustomed to this form of hydraulic mining, which is wearing down the Garo and Khasi Hills, but with 75 feet of rain in twelve months, 1861 was known, even among those to whom rain is no novelty, as the year of the big rain.

While our Centennial was being celebrated in Philadelphia, the southwest monsoon, hitting the spring-board of the Khasi cliffs, leaped into the cold upper air and came down clotted to the extent of 41 inches in a single day. No other region on earth has attempted to break that record.

Throughout the entire plain which flanks the great Indian highway the mean annual temperature is between 75 and 78 degrees. In May the mean isotherm of all India runs so directly over the Grand Trunk Road that one would think that by stepping into the fields on either side he would run off its 88.7 degrees to 88.8 on the right toward the hot heart of the continental land-mass and 88.6 on the left as he turned aside toward the hill stations and breweries which line the lower slopes of the Himalayas from Murree to Darjeeling.

The density of population, like the rainfall, is lighter at the northwestern end; but from Rawalpindi to Calcutta one would have to go a considerable distance either side of the road to find a population less dense



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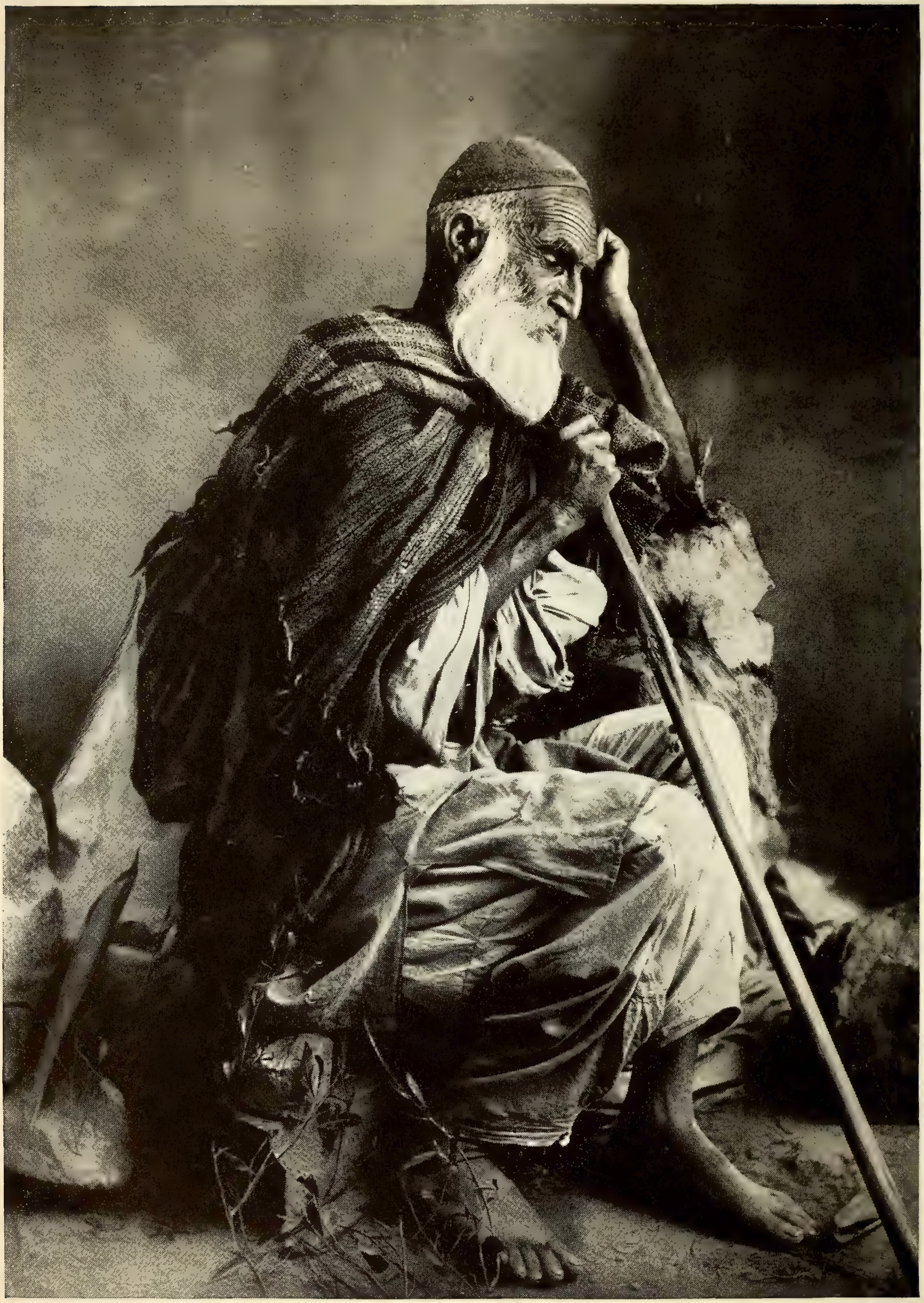
WHERE CENTRAL ASIAN TRADE RUNS THE GANTLET INTO INDIA

This view of the famous Khyber Pass is in the Jangi Gorge, near the Afghanistan end. It shows the roads that lead to Landi Khana, the last British outpost. In the distance is the Khargali ridge.



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THE OLD PATHAN

The Afghan Pathans speak the Pashto language. They make excellent soldiers, and the name includes the virile, warlike Afridis, Wazirs, Swatis, Mohmands, and Orakzais. This old man would be more impressive if his skull cap were wound about with a turban.

than 400 persons to the square mile, although this is largely an agricultural land.

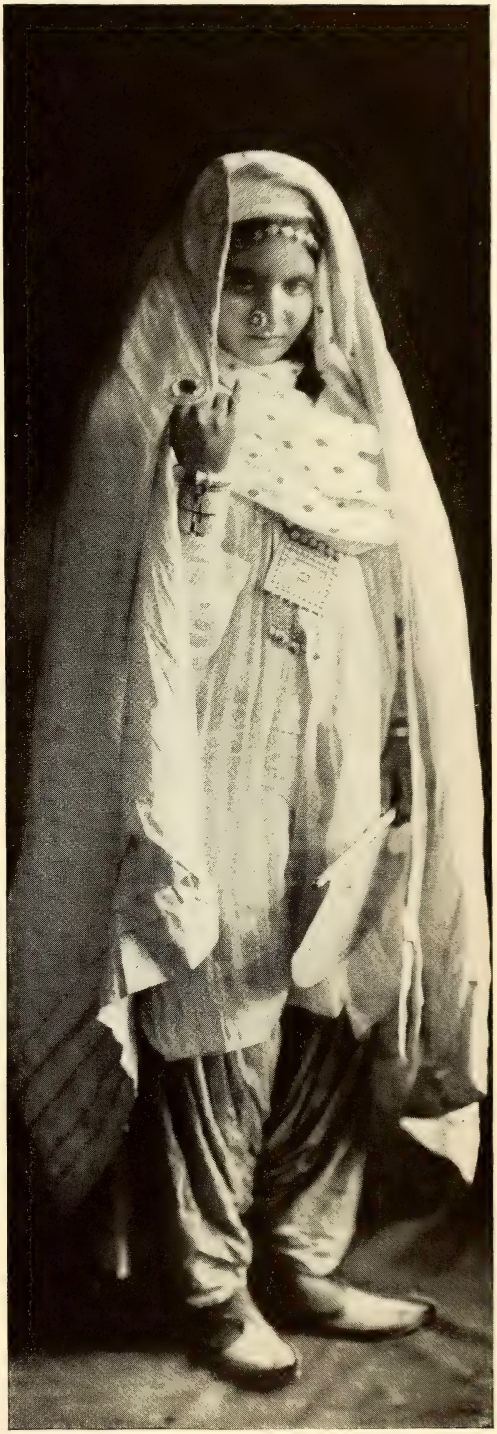
A PANORAMA OF RACES

Races are strung out along the road like ethnological exhibits, but the constant flow of life along this boulevard of people is such that the various stages in the transition, from the Turko-Iranians, whose handsome faces fill the Kabul Bazaar at Peshawar, to the Mongolo-Dravidians, who dominate the racial complex of cosmopolitan Calcutta, are difficult for the stranger to detect.

From the Pashto of Peshawar, which a Persian can understand, one enters the linguistic area of Lahnda, or Western Punjabi, with plenty of Kashmiri, another of the Outer-Aryan tongues, heard in the Rawalpindi bazaar. Then Punjabi, shading off to Hindustani, the *lingua franca* of a much larger region than that where it is common speech. Eastern Hindi, Bihari, and Bengali complete the needs of the man who would thread the road from Peshawar to Calcutta and understand the general conversation throughout. Faced with such un-American demands for glossological versatility, I fell back on English and sign language and found that both were understood, the latter far better than in any part of my native land.

Along the whole road, one finds Hindus and Mohammedans in imposing proportions. Between Lahore and Delhi the Sikhs, with their military bearing, Greek noses, and uncut hair, reveal themselves in considerable numbers, and at Buddh Gaya the yellow robe of the Buddhist adds a touch of variety to the religious complex.

Honeycombed though it be with many other faiths, India is predominantly a Hindu land. There are times in the bazaars of Peshawar and Rawalpindi when one forgets this. A visit to Lahore or a Friday noon at Delhi may cause one to think that the praying Moslems have as wide an influence in religion as their warring forefathers once had in politics; but an hour at the junction of the Jumna and the Ganges at Allahabad or ten minutes in the crowded streets or along the lively river front at Benares will convince one that monotheism is still a thin veneer



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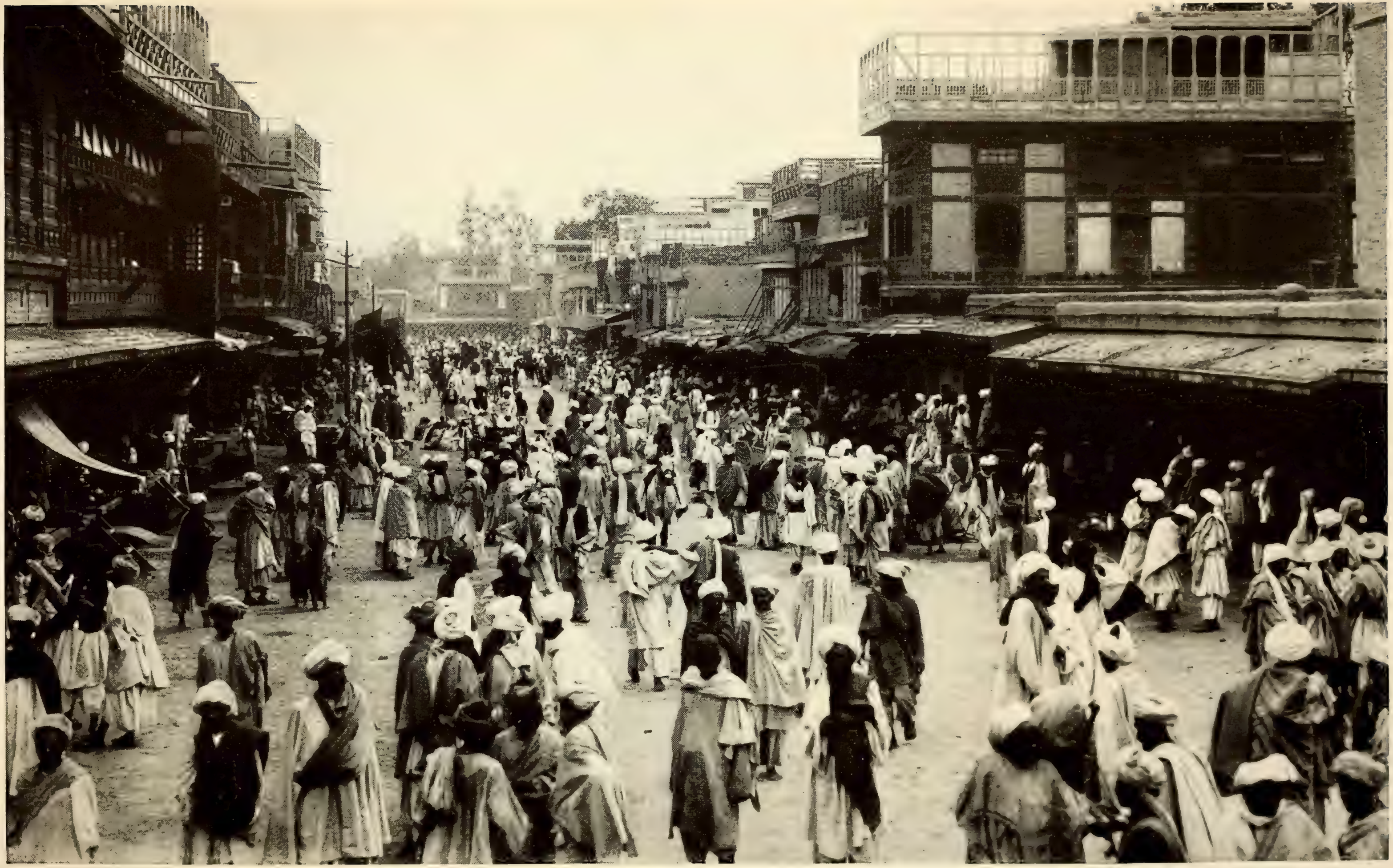
A PATHAN WOMAN OF THE NORTHWEST

Pathan women, who customarily are rigidly secluded, are often handsome, with a Jewish cast of countenance. Many of them have rosy cheeks and fair complexions.



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THE CASUAL PAGEANTRY OF PESHAWAR

The bazaars of North India are always spectacular. In Peshawar one feels that he is on the last frontier, for the outlandish Afghan is a frequent visitor, and even safety matches and safety razors cannot dispel the feeling of potential adventure.

over the huge mass of Hinduism, with its millions of gods.

Following a route where fine sand and smooth clay are general and even a pebble is a curiosity, India's Main Street serves agriculture rather than industry or mining; yet home industries are general throughout its course and few indeed are the towns which are not noted for some material or product unsurpassed of its kind.

A curio lover may go from the Afghan border to the foreign shops of Calcutta and never be far from a place where carpets, wood carvings, embroideries, ivory work, fine fabrics and brocades, soft textiles, metal-work and gracefully shaped pottery may be found. The center where each of these is made may be some distance away, on some side street that leads to Rajputana or Kashmir, but there are numerous places along Main Street itself where all can be procured.

KHYBER PASS, A NAME THAT SUGGESTS ROMANCE

The very name of the Khyber Pass is romantic. To see it on the semi-weekly convoy day is to be transported back through the ages to the time when three wise men, garbed in voluminous mantles like those the Afghans wear, swayed back and forth to the slow stride of their desert mounts while following the Star.

Out in the dry plain below the southern mouth of the Pass is the mud fort of Jamrud, its flat surroundings cluttered with tents and adobe huts. High on a plateau near the Afghan end is Landikotal, a lonely camp held by the guards of the gates of India. Twin roads, an aërial cableway, the slender life lines of the military telephone—these are the only signs during most of the week to indicate that trade here runs the gantlet between threatening hills harboring lawless spirits who consider a hair-trigger gun the best defender of life and liberty, and most effective in the pursuit of somebody's happiness.

Half-way through, almost hidden in a depression which is mortal dull in winter and a place of intolerable heat in summer, is a cluster of tents, mingled with lines of tethered animals, known as Ali Masjid.

In winter the Khyber is more like the Near East than India, but in summer the gash in the sunhot hills is a fiery furnace and a living hell. Then the shaggy Bactrian camels are not seen and winter's flowing robes are cast aside, revealing hard chests weathered brown by sun and wind. At Ali Masjid a breeze would be a godsend. The atmosphere shimmers in heat-waves like the surface of a boiling cauldron.

WHERE THE CARAVANS MEET

Here the two caravans meet at noonday, the one to hasten southward toward the Kabuli Bazaar in Peshawar, the other to finish before nightfall the most dangerous section of its long trail to the Hindu Kush or the noisy khans of Bokhara.

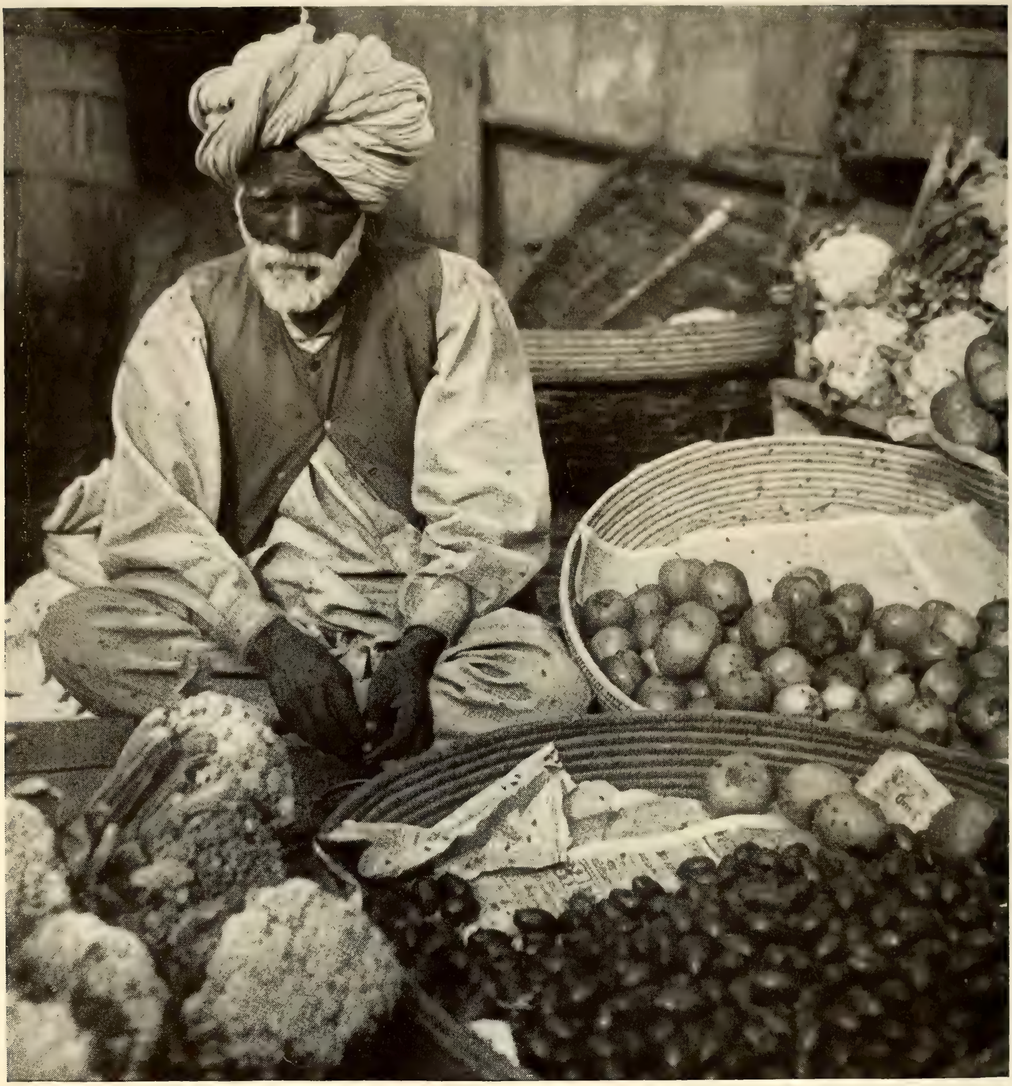
When the rough-coated Bactrians, whose home stretches along the high plateau of Asia from Iran to the Gobi, supplement the ugly but hardier cousins of the lowland deserts, the narrow funnel of the Khyber seems clogged with masses of dark-brown camel hair; but, dashing along beside the road reserved for caravans, hugging the new highway which has been constructed for their benefit or bounding over culverts bridging bone-dry waterways, there roars a covey of military motors camouflaged in their own dust.

"The Man Who Was" pictured the Khyber as the key to India. Whether it be the military or political key today is a question. But the Khyber on convoy day does give a key to understanding why it is that the anthropological museum which we know as India still deludes the world with visions of untold wealth instead of unspeakable misery.

THE CAMEL'S SHARE IN INDIA'S STORY

The camel is the reason. The heavy-duty engine conceals its romance in firebox and boilers; but the zoölogical caricature called the camel is a relief map of romance.

When any one mentions cost per ton-mile, this beast turns up his disdainful nose. No cheap bulk freights for him! Silks, spices, jewels, priceless stuffs of soft pashmina or stiff cloth of gold—these are the cargoes! Who ever saw romance in lentils or block tin? Alchem-



Photograph by Maynard Owen Williams

A FRUIT-SELLER OF RAWALPINDI

Not only is Rawalpindi the Main Street showroom for Kashmir shawls; hither also come the rosy-cheeked apples of the enchanted vale, the finest available in a land of many fruits.

ists don't dream of pig iron. Rich cargoes spell romance. And the camel, ugly drudge that he is, excludes cheap freight as easily as a white-stockinged footman excludes the proletariat. Say Kashmir shawls and the gold brocades of Benares and the camel will prick up his mouse ears and even take a reef in his pendent under lip; but don't mention rice or cotton in his hearing. His leisurely legs protect his hump from vulgar burdens. If India had trusted in him, Manchester prints and cheap German and Japanese manufactures would never have flooded the land.

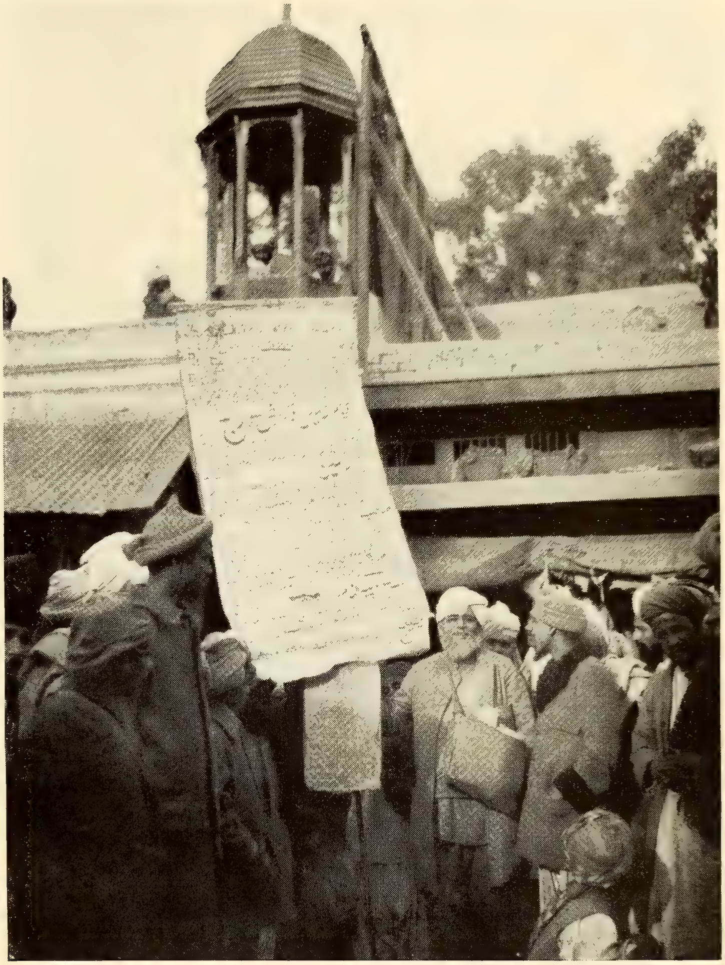
Oh, moth-eaten mesmerist, ugly as a snag-toothed Atropos, evil-tempered as a jinni, high-headed disdainer of your betters, you conjure up a rippling curtain of lustrous silks to hide the eternal tragedy of a hungry land. With India's millions famished for unseasoned rice, you make us dream of rarest spices. With subtle prevarication you depict Golconda before our eyes and with glittering gems blind us to the leprous sores of a famine-stricken land.

The oily iron steed of the smooth and shining trail makes your stilted stride look rheumatic. Dun as a barren hill and drab as the life of an octogenarian bachelor, you bathe the lands you traverse in radiant alpenglow, You are blind, a charlatan and an evil-tempered eyesore; but, because you are an optimist and a magician, live on till death confirms your dazzling illusions in fairest fields of Paradise.

THE KHYBER PASS ON CONVOY DAY

In Bombay, motor trucks will batter your ear-drums if not your body. In Calcutta a striking taxi driver may smash the windshield of your private car. In Madras the bullocks smell of kerosene and lubricating oil. Modernity in India will smudge your collar soon enough. So come to the Khyber on convoy day and dream of the time when fair Circassians passed this way, when jeweled potentates played pachisi with Georgian slave-girls clad in filmy clouds of crêpe as "men" and swept the radiant pieces they had won into the soft splendor of their purdahs.

India is a vast, a prosaic land, whose God of Prosperity is Jupiter Pluvius masquerading under the name of Monsoon, and whose ideal is Nirvana—some escape from the unending round of monotony and suffering to which the hopeless people cling with Sisyphean pertinacity.



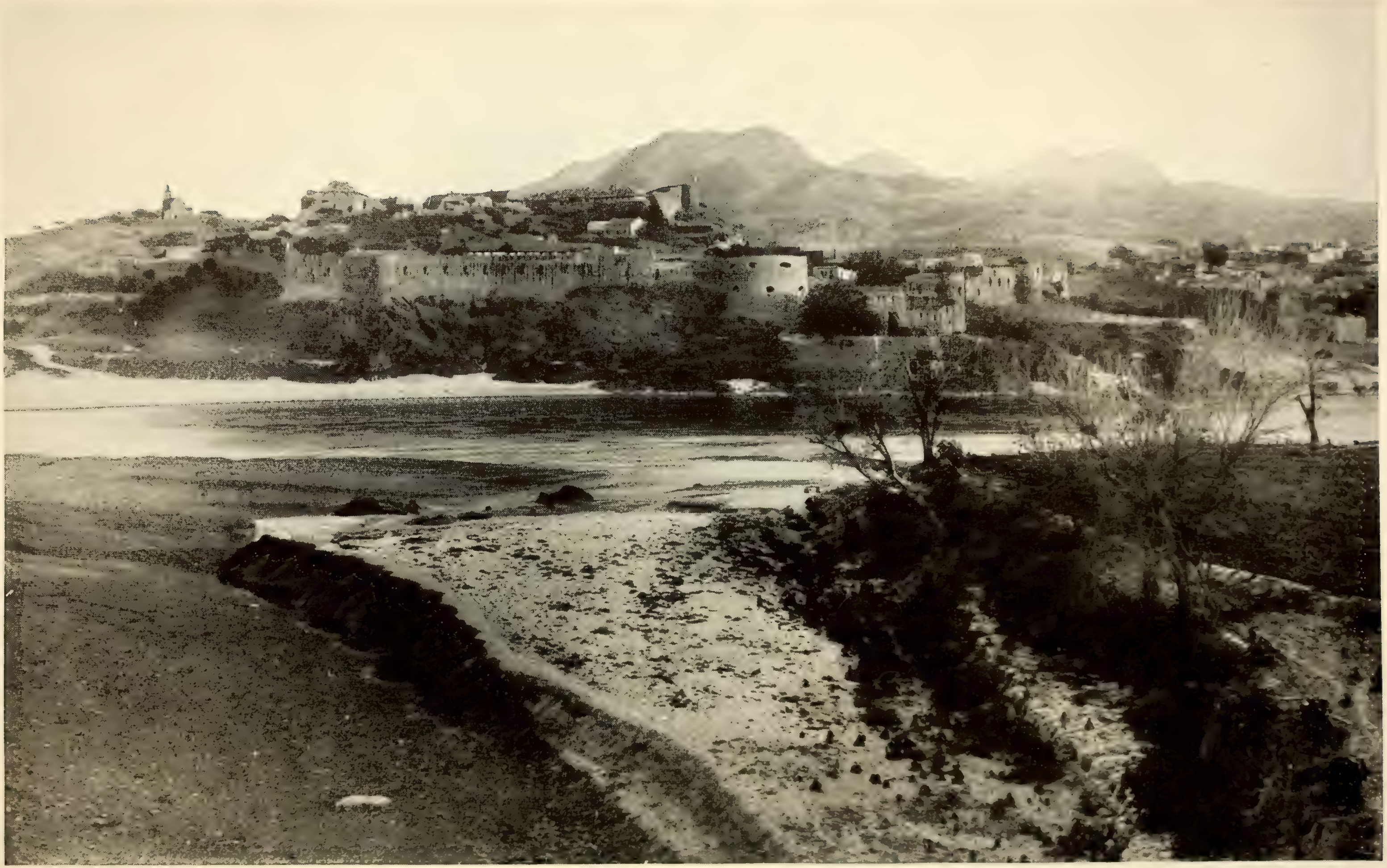
Photograph by Maynard Owen Williams

A DISCIPLE OF HIPPARCHUS AND PTOLEMY

"The stability of the earth and the sun's revolution about it" fully explained for the price of four annas. A geocentric universe is not thought eccentric in Peshawar (see text, page 446).

Peshawar, like many another city in India, is a combination of native city and cantonment—the former closely packed and interesting, the latter widely sprawled and as deadly dull to the casual visitor as the outside of an exclusive club.

There is tennis on excellent courts, sensational polo by military men mounted on splendid ponies, with white-legginged grooms lined up behind the goals, and the side lines a sandwich of attractive Europeans wedged in between the less attractive and more interesting natives, to whom polo seems aristocratic and exotic, although this most ancient of hockey games came overland from Persia through Turkestan hundreds of years



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AKBAR'S IMPOSING FORT AT ATTOCK ON THE INDUS

Ranjit Singh, the Lion of the Punjab and founder of the Sikh State, took the Attock fort from the Wazir of Kabul in 1812. The British then took it and lost it again after a spirited defense by Lieutenant Herbert. It was restored to the British after the second Sikh war.

ago and was played in India long before the English, smashing the Spanish Armada which barred the water-gate to the opulent East, gave impetus to imperialism by founding the East India Company.

The cantonment is the place where the visitor sleeps and eats, and where he obtains permission to traverse the gash in the barren hills through which the Central Asian commerce ebbs and flows. But for interest he drives or, better, plods along the two-mile dusty road which leads to the native city, composed, like its Central Asian counterparts, of mud walls and mud houses, with an added story, which is often nothing more than a wattle fence plastered with mud, on the roof. Here live the womenfolk, and hither the natives climb when the hot breathlessness of the dark rooms below drives them to a summer refuge beneath the stars.

VIVID PICTURES IN THE STREETS OF PESHAWAR

Peshawar's streets are always of interest. One's eyes are entranced by rich carpets from Bokhara and Merv and Afghanistan, bright copper trays, the high color of geometrically piled fruit, the white veils, shaped like collapsed circular tents, beneath which the Moslem women seem struggling to extricate themselves; the Navajo savagery of the painted pottery and the silken sheen of the bright-colored lungis, which, bound round a pointed red or gold skull-cap, transform ordinary-looking Punjabis or Pathans into supermen.

The turbans of India, like the sheepskin shakos of Turkestan and the sombrero of the cowboy West, are magical headgear which make heroic figures of commonplace men. After these sturdy men of the frontier hills, the fat Bengali will be a comic figure.

The grain market in Peshawar is like the one in Samarkand, although it has less color. The beautiful lungis, or turbans, of soft tones, with bright bands of a contrasting hue across the free end, alternate with solid-colored ones of yellow, lemon, pink, or white. The coats reveal much of the khaki of war times, although many a Pathan wears a foreign-style vest over a long white shirt hanging outside full trousers, which are gathered up on the inside of the leg so that they hang in concentric folds looped downward from the knee.

BAGPIPES HERALD CHRISTMAS MORNING NEAR THE KHYBER PASS

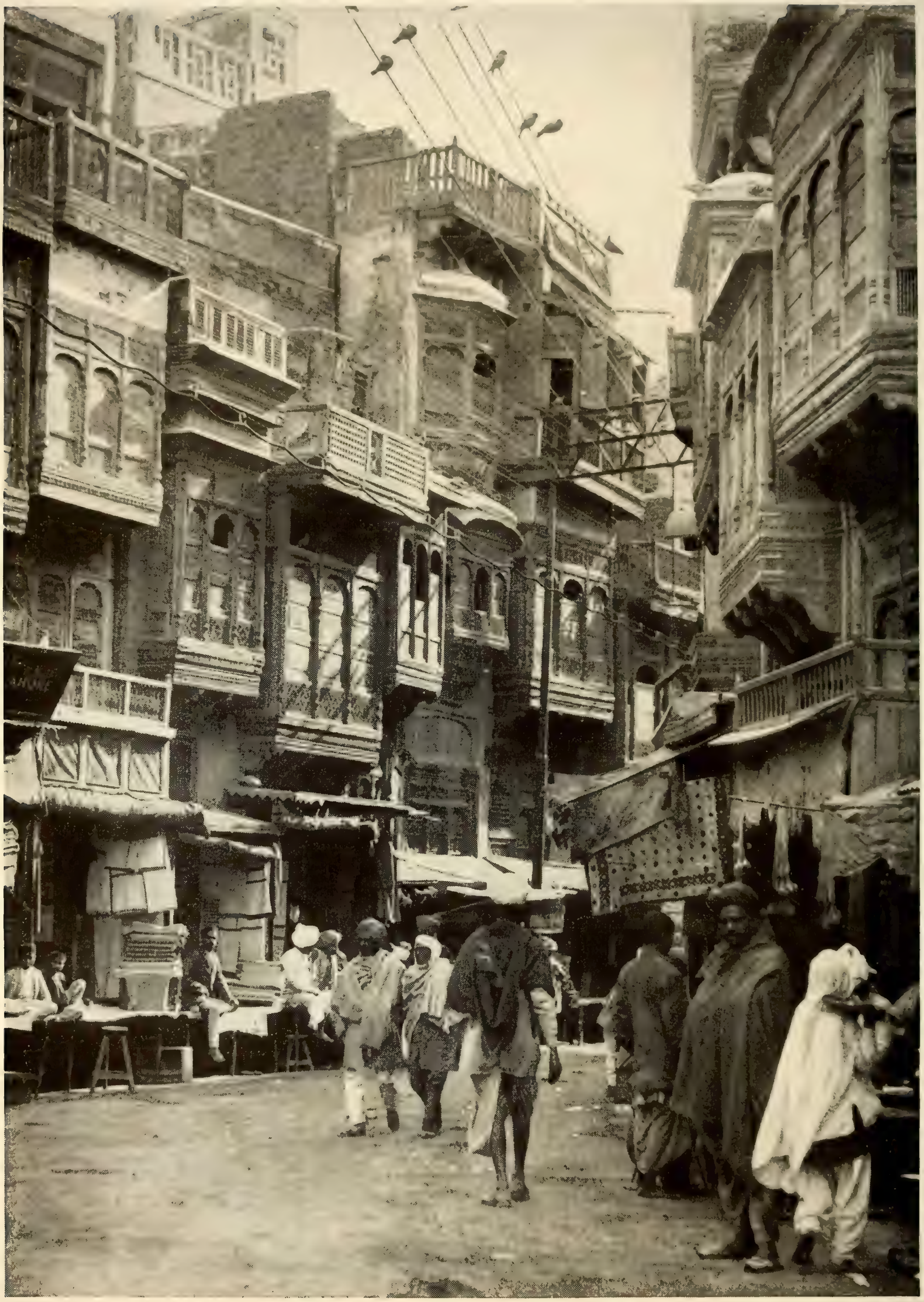
I had gone out to the Khyber the day before Christmas, and on a cold, clear morning which needed only snow to remind one of reindeer and sleigh-bells instead of camel caravans and dusty roads, we were wakened by the sound of bagpipes outside the hotel. This inopportune method of Christmas caroling first made me think that some Scotch troopers from the army lines had come to serenade some of the officers who were in Peshawar for the holidays. But when I saw the two squirrel-cheeked Indian lads crushing wheezy, melancholy moans from the bloated bag, I thought of that English joke impregnated with American slang, "Why do bagpipers stride up and down while they play? Do they think it will make a hit?" "No; they think it will make them harder to hit." Sleep was out of the question.

Leaving the cantonment, we passed the railway station, where the Calcutta mail, starting its 1,600-mile dash, was belching forth a pearly cloud into the leaden sky, and swung into the dusty road which leads to the native city.

The heavy mist, which still hung low, softened the hard lines of the Oriental scene. Across a field where grain had been, great arching trees showed dimly through the haze and a white-clad tailor, squatting beside a steaming irrigation brook, added a fairy touch to the scene. Farther on a satiny canal shimmered in the morning sun, curving away from the path of Phœbus into a silvery distance in which crude mud walls and a slender minaret took on a beauty worthy of the day.

As the dark shadows of a row of small arches grew out of the haze, a long line of Bactrian camels, thick of neck and slow of foot, emerged from a city gate and made their way to a muddy drinking place, their uncouth drivers muffled in heavy cloaks, but with their dark-brown ankles bare above rough slippers with pointed heels and loop-the-loop toes.

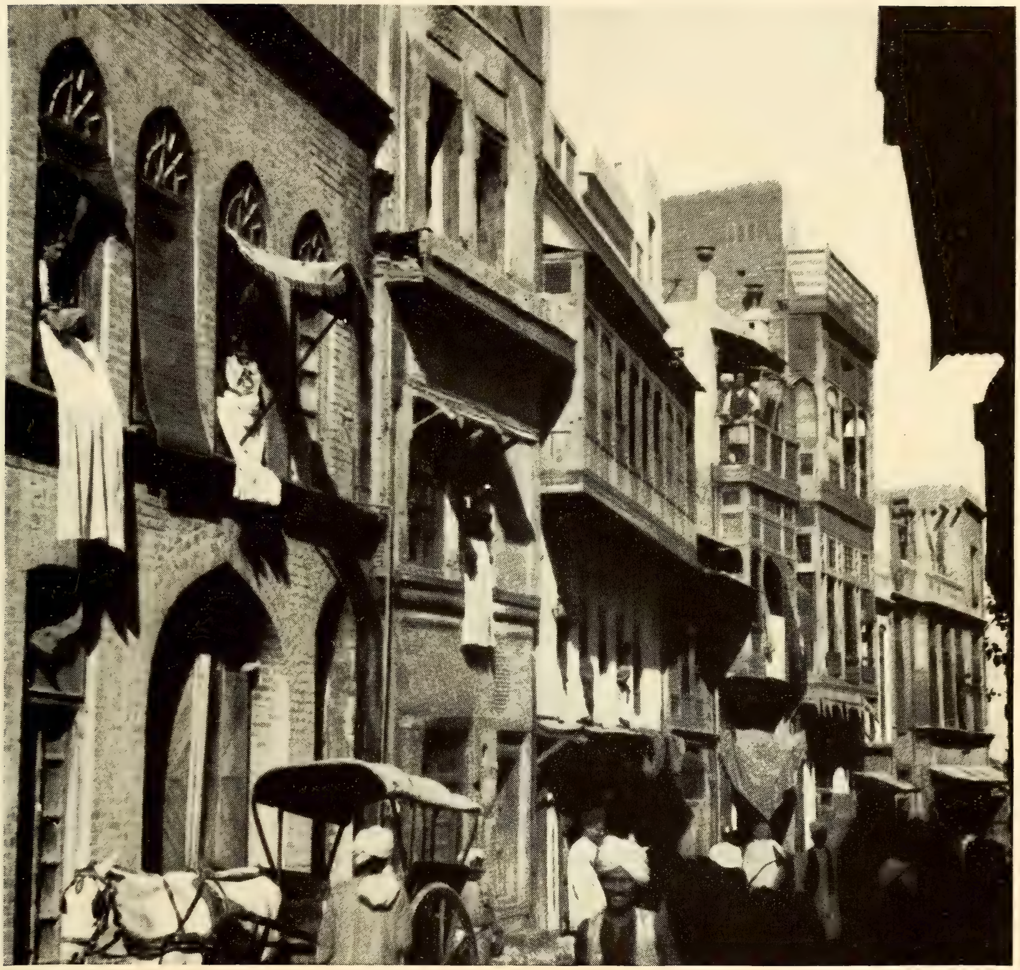
Walking through narrow streets between blind walls of monotonous same-



Photograph by Maynard Owen Williams

WHERE ELECTRICITY DISPELS THE ILLUSION OF ARABIAN NIGHTS

The balconies of Lahore suggest love feasts and intrigue; but the shops below are devoted to prosaic, though often eloquent, commerce, and the electric light now spies on the incognito wanderings of the modern Haroun al Raschid.



Photograph by Maynard Owen Williams

A SECTION OF THE PEARL BAZAAR IN LAHORE

Not all Indian women are "in purdah," or behind the curtain which shields them from public observation. The harpies advertise their shame as vividly as the holy men do their sanctity. Hypocrisy is indulged in only when it does not interfere with professional success.

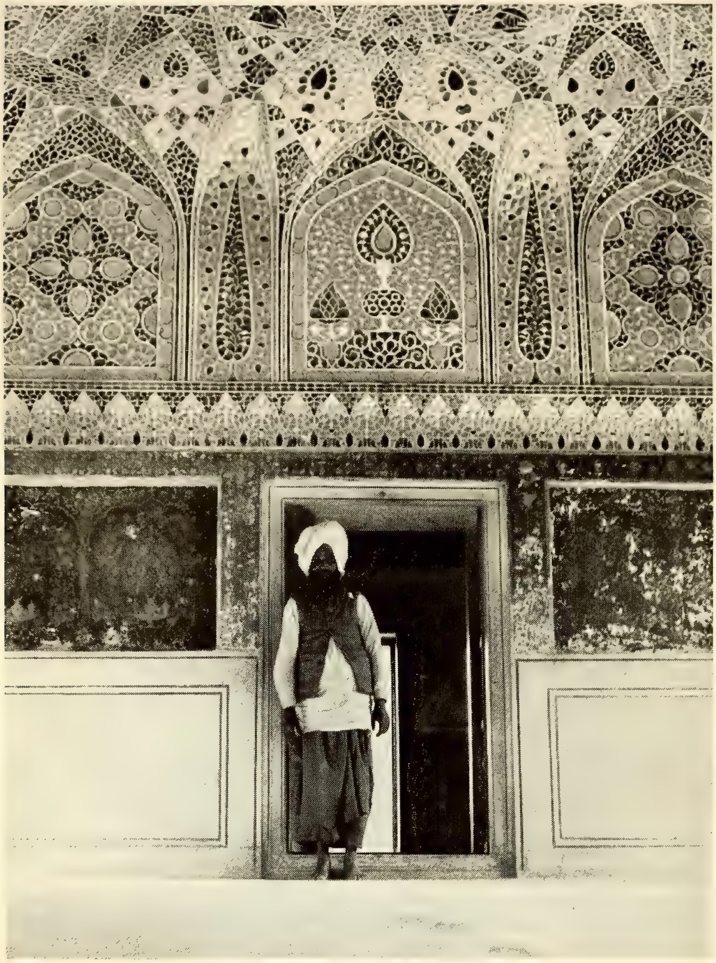
ness, one almost expected to find chalked crosses added by Marjaneh to the robber cipher which was to have undone the dull-witted Ali Baba.

MOSLEM WOMEN PIONEERS IN ADOPTING SOCKS

In a sunny corner, wedged between mud walls, an open-air tailor shop turned snowy masses of white cotton cloth into the latest style of masculine garb to the throbbing song of several hand-power sewing-machines, while a street peddler whose main display was short socks such as Moslem women like, but northern men forswear, stood by and watched.

In another street deft workers were patterning the insignia of some frontier regiment on bright-colored squares of silk with viscous wax. These chromatic nightmares would some day educate distant Yorkshire in the art motifs of the unchanging East. If the East would only remain unchanged! But to voice such sentiments in these hectic times is to suggest sympathy for Gandhi and his followers, who seek at this late day to turn back the hands of the clock to the time when steam, through freedom, went to waste and implements were fashioned in Biblical simplicity.

Then through the shameless street of



Photograph by Maynard Owen Williams

THE PALACE OF MIRRORS AT LAHORE

Thousands of tiny mirrors set in plaster and interspersed with porcelain figures form the roof decorations of this part of the ancient palace. Behind are smaller rooms which can be darkened so that a candle moved slowly in a circle by the bearded guide is reflected in a myriad of dancing lights.

the harpies and cut into a main bazaar, where the mellow glint of hand-hammered copper suggested Mohammedan ways, just as the more radiant brass of Benares would later signify the Hindu faith.

A crowd was gathered about a handsome man who bore a banner and a wallet, the one proclaiming his ability to prove the sun's revolution about the earth, the other containing copies of the proof, which he was peddling to the credulous at four annas a copy. Although Einstein had not yet shaken my faith in the old-time planetary laws, I refused the invitation to debate the theorem before that interested mob, even though he generously offered to translate my arguments into Pashto or Hindustani for the benefit of the audience. In Peshawar it is not even necessary to hire a hall, nor is the soapbox essential as a foundation for Utopia.

THE BARBER IS A PUBLIC TORTURER

At a prominent corner, near the principal mosque and surrounded by the booths of money-changers, who, like Ali Baba's wife, measure the ancient-looking Afghan currency which here is changed for Indian coins, there is a small kiosk wherein a sloppy fountain soaks a floor deep hid in cast-off pith of tooth-crushed sugar-cane. Its rails are hung with flabby skins which the tanners leave for an ardent sun to cure, and on the sidewalks, safe from the feet of plodding bullocks and slow camel trains, a bevy of barbers practice chin-golf on pained faces, whereon they never make the course in anything like par. The claims of any modern shaving preparation would sound like a fairy tale to those tortured beings whose heads and chins are razed with ruthless lack of emollient aids to a close shave.

A side street climbs to a high tower from which mere man could feast his eyes on a Moslem paradise peopled with houris were it not for the fact that this is well known by the women of the neighborhood, who, when they venture forth upon the flat mud roofs, draw close their veils to shield the modesty which is their all.

No city reached by iron rails can quite express the East, but mud Peshawar, rising humbly from a widespread plain swept half way round with hills, is well worth visiting, even if one approaches it by *de luxe* express in a first-class compartment from which the very spirit of the Orient is barred until the ticket-taker comes with deferent voice and asks for "tikkuts" in a dialect which no Western tongue could imitate. The northern end of Main Street is full enough of strange, exotic charm to warrant the trip of nearly sixteen hundred miles, each one of which has interesting features of its own.

AT THE TOMB OF LALLA ROOKH

Between Peshawar and Rawalpindi, Main Street and its attendant railway cross the swift Indus at Attock, where a fort erected by Akbar to protect his Indian holdings from his brother, Hakim Mirza of Kabul, reminds one that he is on an historic highway. Traffic policemen and corner cigar stores of modernity have not yet taken the places of the forts and caravanserais which marked the cross-roads in earlier days. Here Alexander the Great is supposed to have crossed the Indus on a bridge of boats.

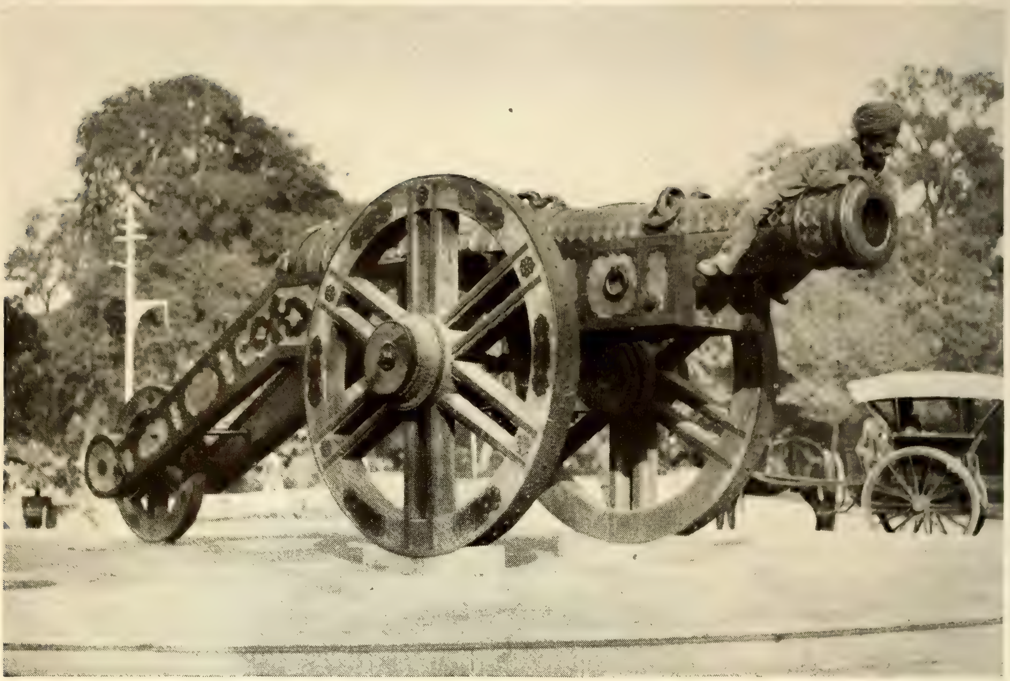
Photograph by Maynard Owen Williams

A PRIESTESS OF DANCE IN THE MOTI BAZAAR: LAHORE

Vivacity, audacity, elusive charm, and verve are not characteristics of this dancing girl. There is little novelty in her profession in the East. Smiles do not always blossom on lips that are red, nor can rich jewels awaken the care-free spirit of carnival (see text, page 450).

A curve of the road soon hides from view the turbid whirlpool swirling past slate cliffs, on one of which the towering fort looms high, and the train passes between barren fields to a small station near the tomb of Lalla Rookh.

Possibly no other legendary spot, unless it be the corner of the Père la Chaise in Paris where Abelard and Heloise rest



Photograph by Maynard Owen Williams

KIM'S CANNON AT LAHORE

"He sat, in defiance of municipal orders, astride the gun Zam-Zammeh, on her brick platform, opposite the old Ajaibgher, the Wonder House, as the natives call the Lahore Museum."

side by side and sentimental lovers come to deck their graves with flowers, is steeped so deeply in a borrowed luster due to love.

Here, at Hassan Abdal, the Bucharian prince, masquerading as a minstrel, strummed his seven-stringed *vina* and recited a story in which he set forth the beauties of the Kashmir Vale toward which the rose-veiled litter of his beloved one was bound. It was the story of Nur Mahal, the Light of the Palace, and as he sang he gathered inspiration from the eyes of Lalla Rookh, from which looked forth a love she sought to kill because of her betrothal to a man whose unfamiliar image young Feramorz eclipsed.

Not by the crystal pools of Shalimar in Kashmir's rosy vale, but close beside the shining rails of raucous iron steeds, there stands the tomb of Lalla Rookh. No one imagines that the lovely daughter of Aurangzeb really lies there. That tiny tomb, laden only with a legendary queen, like the ungainly camel, remains to lend a touch of poetry to a decadent land.

At Agra one may see the fairest monument royal lover ever had erected to his wife's memory. The Taj Mahal is known to the world as a dream in marble. But the tomb of Lalla Rookh is so lowly a structure that it does not even confine the imagination to material walls. And when one leaves the spot and sees the hurried natives crowding into modern railway cars, he mourns the loss of a resplendent past, when men knew how to love.

RAWALPINDI, ENTREPÔT FOR KASHMIR SHAWLS

A short, dull ride brings us to Rawalpindi, where the mail motor is impatiently awaiting our train. If we choose to enter the enchanted vale by mechanical power, we can roll into Srinagar tomorrow afternoon, after having braved the snows of the 7,700-foot pass above Murree. Along those two hundred miles of road we shall never be for long beyond the sight or sound of automobiles, for the patient bullock cannot keep pace with the transportation demands of India's "Happy

Photograph by Maynard Owen Williams

INDIA'S GREATEST CASTE-DESTROYER

To the railway train is due much of the modern breakdown of caste rules and Oriental courtesy; "Each for himself" is the rule beside the tomb of Lalla Rookh, as it is in the subway beneath Trinity Church.

Valley," circled though it is in winter by snow-clad hills.

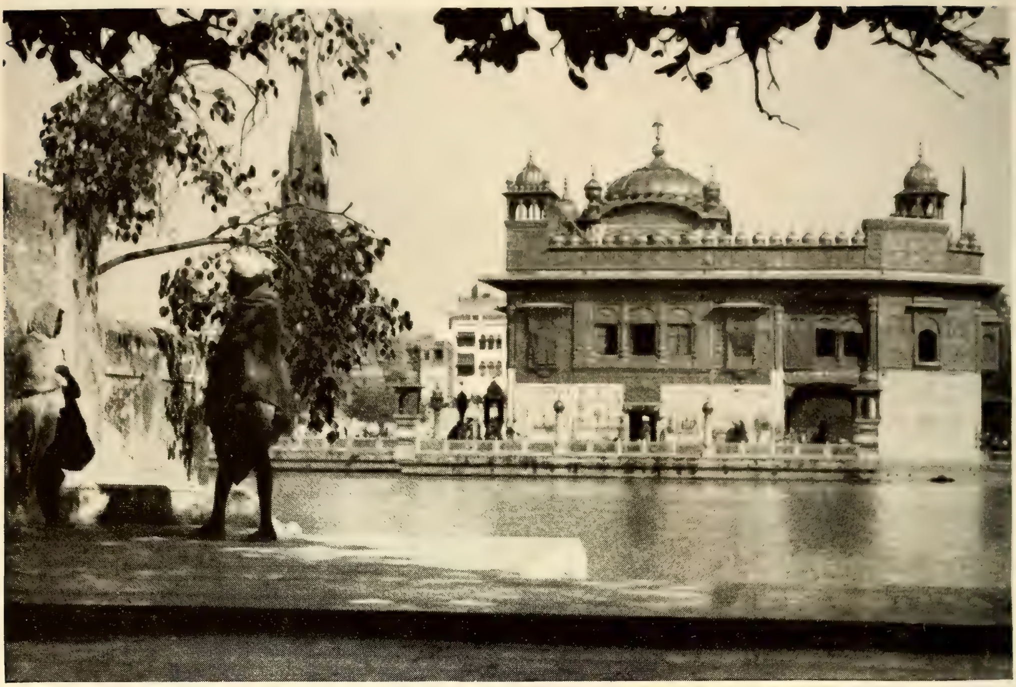
But, attractive as side trips are, there are reasons for staying on the main road. Rawalpindi will engage us for a while, largely on account of its being an entrepôt for the soft shawls, the fine wood-carving, and the gaily-colored embroidery of Kashmir. The old rose, magenta, and soft purple embroideries of earlier and more discerning days are now difficult to obtain, and the present trend is toward autumn maple tints and a turquoise blue which seems to reflect the evening light on the dome of Timur's tomb, far away across the mountains in silken Samarkand.

One can still obtain warm shawls, ample enough to give a Carmen room in which to sway lithe limbs while stamping pretty feet to spirited fandangos, but so soft that they can easily be passed through a wedding ring. The matchless shawls of old, however, are no longer to be found in the market-place. One mass of beautifully blended colors and intricate details, these priceless treasures were elaborated on the loom and were not, like so many of the modern shawls and *chadars,* simply soft stuffs of wool or *pashm,* decorated with chain-stitch needlework, ground out on a machine.

IN LAHORE, CAPITAL OF THE PUNJAB

Lahore, the city of Kipling and Kim, is worthy of a story of its own, though the Anglo-Indian genius has already sketched its charm in deft phrases which suggest the very spirit of the place. As capital of the Punjab, Lahore is being beautified with many buildings which retain the spirit of the past and in the planning of which the father of the Bard of the Barrack Room had a hand.

The crowded bazaars, overhung by balconies behind whose lattice fronts bright eyes look down upon a world from which the women are withdrawn, are always amove with life, and out behind the Great Mosque, whose lonely beauty gains impressiveness from lack of teeming crowds, pastoral flocks make one forget the narrow streets, while shep-



Photograph by Maynard Owen Williams

THE DARBAR SAHIB, OR GOLDEN TEMPLE OF AMRITSAR

Made of gilt, copper, and marble, this sacred shrine of the Sikhs houses the Holy Book of their faith. There is also a small Hall of Mirrors, where the Guru once sat, which is swept out with a peacock-feather broom Around this jewel, whose brightness was stolen from Mohammedan buildings in Lahore, lies the Pool of Immortality (see text, page 453).

herds smoke their gurgling hookahs and evening settles down behind bright bulbous domes.

TAKING A PHOTOGRAPH IN THE "PEARL BAZAAR"

Lahore, like many another Main Street city, has its "pearl bazaar," where wait the harpies "who paint their eyes and trap the stranger," where "Flowers of Delight" sit on soft cushions gazing downward to the street.

At one arched window I caught sight of massive earrings and a necklace worthy of a better place. Ascending steep, dark stairs, I sought a photograph of such a dancing girl as dyed the face of Kim so that he seemed a low-caste Hindi boy. There was bargaining—most serious. Amply able to trap a stranger, these modest-mannered women were at a loss to classify me; but once convinced of my readiness to play fair and not take photographs without permission, several of them did what they could to make my photographs worth while.

One furnished a second bead chain of soft gold to hold in place the raven hair of the girl whose picture I desired; another lent a nose-ring which she thought would add luster to the portrait; and all aided in arranging the dress of my subject until a natural effect was out of the question. Her fat hands were weighted down with rings, but the pride of her existence was a cheap wrist-watch, which she refused to conceal.

Her hair was neatly parted and looped low above each temple with two chatelaines of soft gold. She wore a white waist, long and with a skirt to it like a Russian shirt, and over this a woven vest of checker-board pattern in mauve and tan edged with purple. Her full trousers were spotless white and her heavy tinkling anklets were marvels of intricate design. Her dark tan socks were wrinkled and faded.

A SOLEMN STRANGER TO DELIGHT

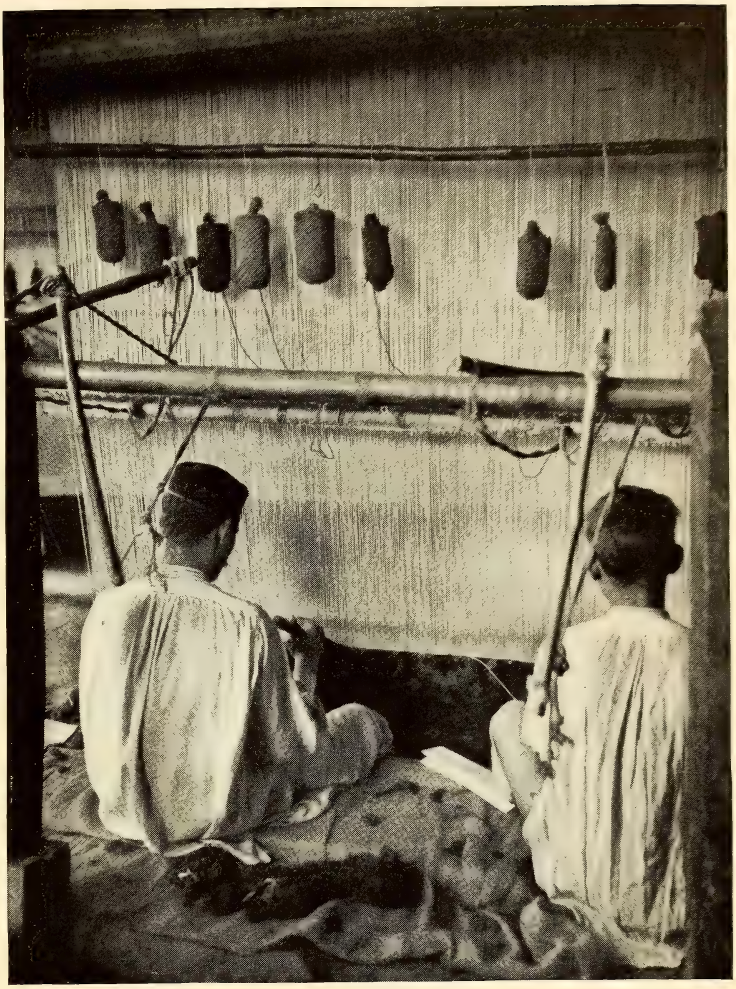
As she sat beside her window looking down into the street, she was a picture of barbaric showiness and amazing lack of taste. Her eyes were hard, not as of those who repeatedly taste bitter-sweet, but the straight-looking eyes of a man of purpose. The crown jewels of a continent could not have rendered her attractive, yet simplicity might have given her real charm. Priestess of pleasure though she was, she seemed a solemn stranger to delight.

The wrinkled socks and the white waist buttoned high beneath a necklace that would protect a bull-dog's throat were too much. I had glimpsed from below a picture of heathen witchery. Confronting me was a being for whom a Milton or a Dante could find no words but prose. I suggested removing the socks and hiding the triangle of white cloth at the throat behind the ugly vest.

To have the socks removed was the work of an instant. Emboldened by this I even tried to get her to lay aside her shiny wrist-watch; but under no consideration would she bare her throat to me or to my camera, even though she wore enough jewelry to hide some modern creations. The old woman of the place understood my wants and finally the cloth was pushed aside, disclosing a very fair throat.

"I tell her foreign womens do so," explained the antique hag to account for her success.

By this time a second girl with a giggle asked that her picture be taken, and again some of the jewelry changed hands. Her eyes laughed, and her vest of soft plum-colored plush reminded me less of a fashionable sport costume at Piping Rock than the checker-board vest of her sister siren.



Photograph by Maynard Owen Williams

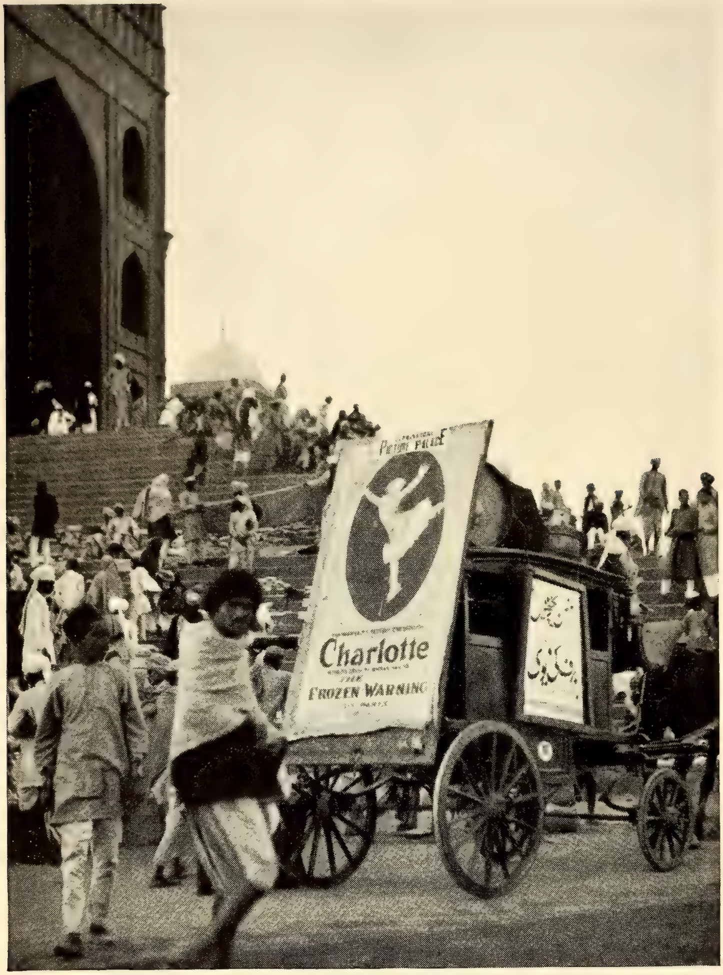
AT WORK ON A LARGE CARPET IN AMRITSAR

Around the tough warp fibers the woolen yarns are tied with various types of knots. They are then beaten close together with a heavy metal comb and the nap is trimmed down to uniform length. A single American firm buys most of the rugs of Amritsar's leading factory.

A GIRDLE OF GARDENS AROUND THIS CITY OF THIRTEEN GATES

Then up from the street there came a lost and lonely soul, her pock-marked cheeks deep rouged and her sparse hair arranged in grotesque curls plastered to her head. The other women looked down upon her. Even amid such pitiful scenes of sordid show she was declassé. As though seeking to retain some vestige of my respect, she sadly waved aside the tip I proffered her.

Around the dusty base of the cityward walls of the ancient fort, great herds of water-buffalo stand, baking their parched hides in the sun, but around the city of the thirteen gates there runs a green girdle of gardens pleasing to the eye as well as the body. Only on the northwest is this circle of coolness broken by a dusty expanse stretching toward the Ravi River.



Photograph by Maynard Owen Williams

THE FRONT STEPS OF THE GREAT MOSQUE AT DELHI

With the coming of the afternoon shadows the red sandstone steps of the Delhi mosque are dotted with color. The whole incline becomes a bustling bazaar, draped with silks and cluttered with pottery, and beside this truly Oriental scene the itinerant billboards of the local cinemas bespeak patronage and modernity.

Situated at an intersection of two streets is the Sonehri Masjid, its three golden domes a radiant brightness in the deep shadow of the bazaar, and farther on one comes to a square across which is seen the great arched entrance to the Mosque of Wazir Khan, its tiled walls colored in a way that suggests Shakh Zinda, on the outskirts of Samarkand.

AMRITSAR, THE CITY OF CARPETS

Leaving by the fort-like station of Lahore, within whose battlements a few brave men could long withstand a mob and thus protect the railway lines, an hour's ride brought me to Amritsar, whose carpets all the world now knows. Within the long, low sheds the weavers work with shaggy balls of varicolored wool, and designers draw improved patterns for Oriental rugs from plates published by the Austrian Commercial Museum. In Peking I found a rug-maker copying the knot and colors of a carpet from Merv. In Amritsar several looms were given up to Chinese designs.

As far as India is concerned, Amritsar is not known for its carpets, but as the Mecca of the stately Sikhs, who furnish Shanghai with policemen, the Indian army with its handsomest warriors, and the government with many an anxiety.

The stout-hearted Sikhs are a race of lions, each bearing the name Singh. For enduring courage they rank with Richard Cœur de Lion.

Photograph by Maynard Owen Williams

A DENTAL STUDIO ON DELHI'S CHANDNI CHAUK

The Delhi dentist is not restricted to humorous journals and fiction magazines for his waiting clients. He shows how the job is done and pictures a beneficent goddess in place of the imp who is prodding one's jaw with red-hot needles.

The horrors of the year before were still fresh in the memory of the people and I was advised not to go into the native city.

So attractive, however, is the scene around the Nectar Pool and the Golden Temple of the Sikhs that I could not resist the temptation to wander barefoot around the square tank in the middle of which stands the glittering building in which the Granth is housed. It may have been reaction from the advice of anxious friends, but nowhere in India did I find more courtesy and conceive a deeper respect for the people with whom I came in contact than in the sacred city of the Sikhs.

Amritsar is a low-lying city with a bad reputation for malaria, but is second to Delhi as a commercial center of the Punjab. Two religious fairs, held in April and November, did much to spread the fame of the city, and famine in Kashmir drove expert weavers to Amritsar, there to establish an extensive industry in shawls.

It was about this time that the Kashmir shawl furnished the fabric for many a seafarer's romance and the shoulder covering for the élite of Europe. The demand was so great that 4,000 looms were soon competing for a highly remunerative trade. The fickle fashions of Europe changed, bare shoulders became popular, the shawl industry suffered, and soon a thousand looms could turn out all the loveliness the world demanded.

But Amritsar, like Nizhni Novgorod, had gained a reputation, and trade continued to come to the waterlogged city of the mesopotamia or *doab* of the Punjab. From beyond the Hindu Kush came silk goods which the people of Amritsar copied so successfully that now Kabul looks south instead of north for such silk as Bokhara formerly supplied to the trade mart in the midst of which the Sikhs raised their holy temple.

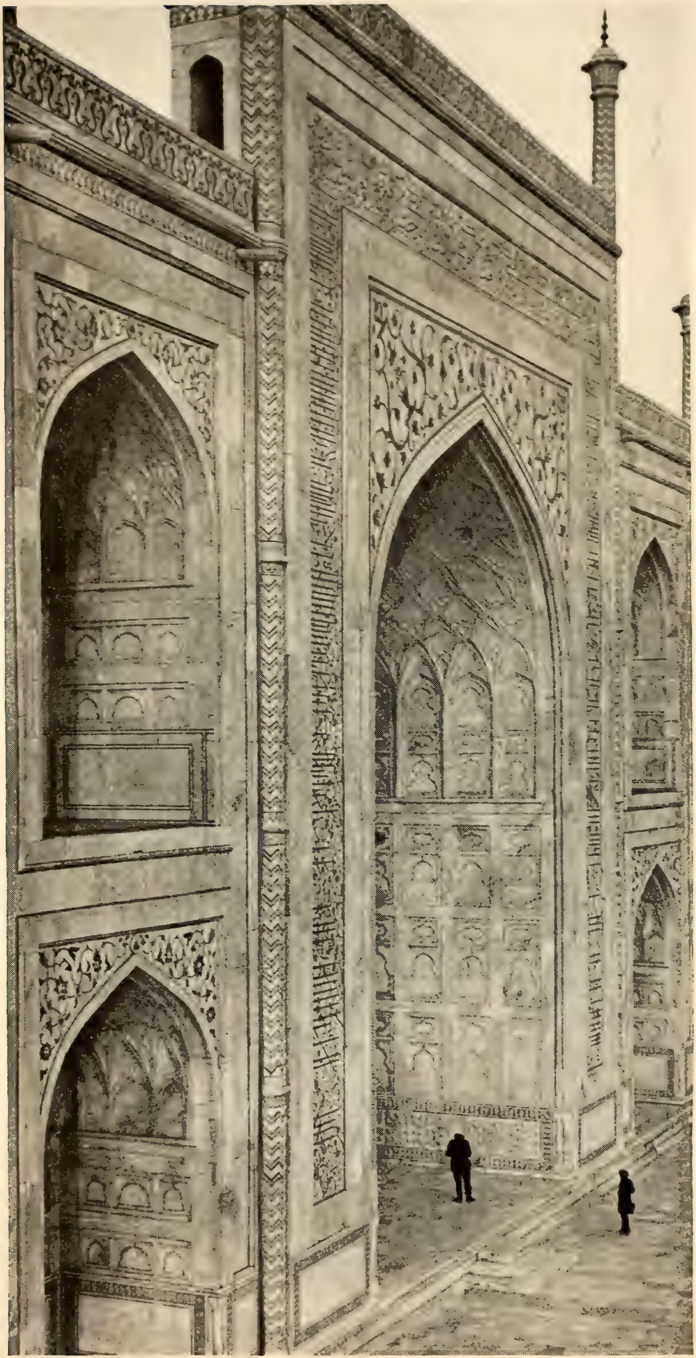
WITHIN THE SIKH TEMPLE, A SCENE OF BEAUTY

The Sikh temple inclosure seems formidable at first. Not only must one remove his shoes, but it is forbidden to carry any tobacco inside the gate which leads to the sacred pool. But once inside, the beauty of the scene soon wins one's admiration. The women are unusually handsome and their broad trousers of wine-colored velvet bear glittering appliqué fleur de lis figures in pure gold thread. Their filmy scarves, like clouds of mist, are marked with bands of gold or silver thread, giving them a rich appearance.

A marble causeway with rows of gilt lamps on each side leads from a small entrance gateway, beside which a handsome doorman with a heavy silver mace stands guard, to the Golden Temple itself, radiant as the noonday sun in the midst of a turquoise sky.

In the center of the temple is a widespread cloth upon which a shower of pilgrim coins is continually clinking. The rupee I tossed down won for me a reward of rock candy fashioned in the form of a bowl. Upstairs a noble-looking Sikh was reading the Granth, or Holy Book. A strong side light fell on his fine face and snowy hair and I wanted to take his picture. That was forbidden, but I was taken to see the manager, a high priest to whom all things are possible.

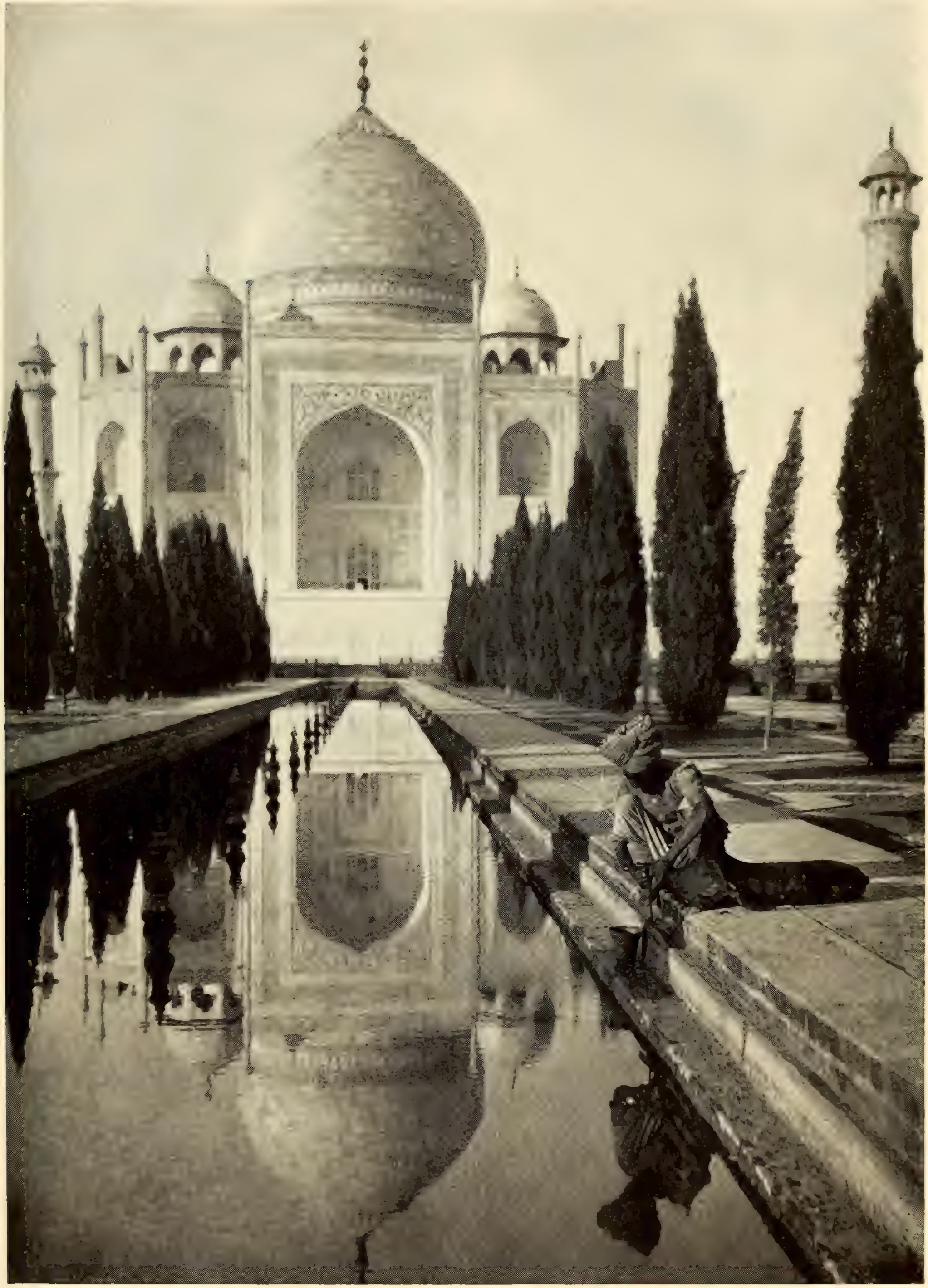
He admitted that he could give me permission, but refused, not on the ground that it never



Photograph by William W. Chapin

ONE OF THE DEEP BAYS WHICH ADD GRACE TO THE TAJ MAHAL

The appreciative thanks of the National Geographic Magazine are due to Mr. William Wisner Chapin, of Rochester, N. Y., for permitting the use of a number of his unusual India photographs, both in color and in half-tone, in this and forthcoming numbers of the Magazine.



Photograph by Maynard Owen Williams

THE MIRRORED BEAUTIES OF THE TAJ MAHAL

As though the loveliness of the Taj were not enough, the landscape artists provided a silver waterway lined with fountains, behind whose spray a second Taj appears reflected as through a silken veil (see text, page 459).

Photograph by Maynard Owen Williams

A RELIGIOUS DEVOTEE CHANTING MANTRAS AT THE ALLAHABAD MELA

The barren sands at Prag, the place of sacrifice, yearly teem with pilgrim crowds and every twelve years the Mela is an outpouring of millions. In 644 A. D. the Emperor Harsha here distributed the wealth gained in six years of war to Buddhist, Jain, and Brahman holy men, in a festival which lasted for seventy-five days.

had been done, but because to do so would, in his estimation, be a betrayal of trust.

"I was given to believe that anything you sanctioned would be all right," I said.

"Quite so," was his reply, "but one in a responsible position must heed the superstitions and desires of even the most ignorant." Had he been a politician rather than a religious leader, he could not have been more considerate of his constituency.

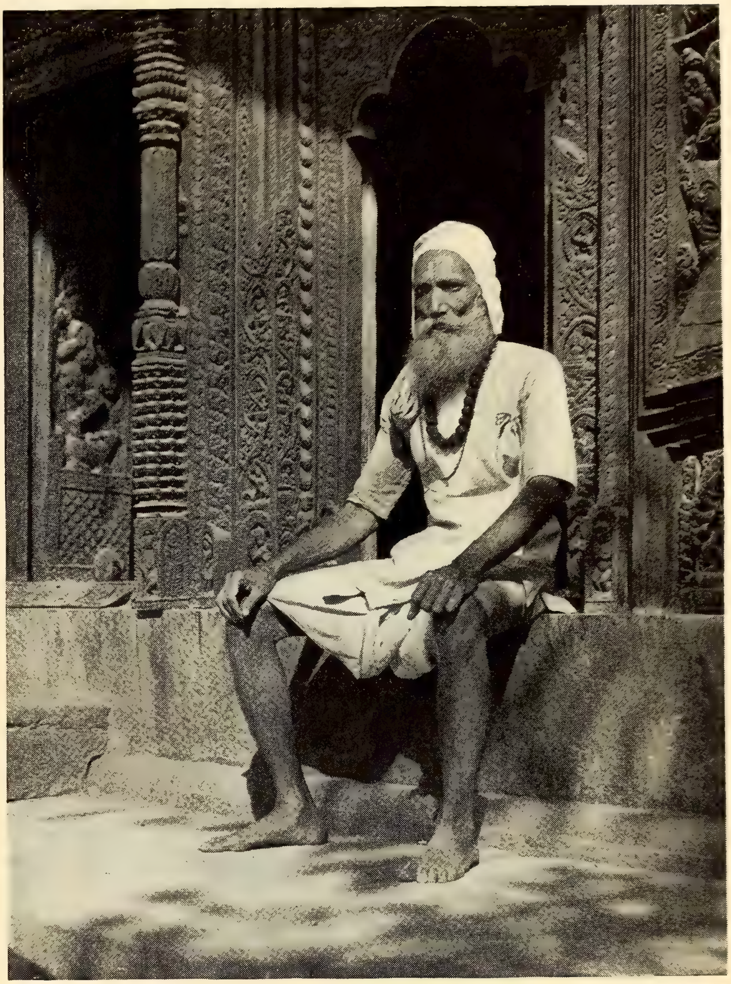
THE SIKHS ARE A REFORMED SECT OF HINDUS

It would be proper to call the city of immortality the Jerusalem of the Sikhs rather than the Mecca, for the Sikhs form only about one-ninth of the population, one-half of which is Mohammedan, while the Hindus outnumber the Sikhs four to one. The Sikhs are a reformed sect of Hindus, disciples of the Gurus, who were their religious leaders. The sect was founded by Nanak, a native of Lahore, late in the fifteenth century. They denounce idolatry and have abolished caste.

That these fierce fighters are not intolerant is shown by the fact that one of their number has built a Mohammedan mosque and a Hindu temple in Rawalpindi, and that their sacred courts swarm with Hindus, Moslems, Lamaists, Buddhists, and Animists

In one part of the grounds some naked

fakirs basked in the sunshine of publicity. Near them some Bhotias had laid out a camp, from which they were coaxed by a curiosity to look at each other through my camera. Several of them strongly resembled the Chinese of Shantung in winter garb. There were some others whom I could not classify, the women looking like certain Indian women of South America, with large rings in their ears. Evidently the Golden Temple is a magnet which draws many types of visitors, and well it may, for the inclosure, together with the crowds it attracts, is one of the splendid sights of India.



Photograph by Maynard Owen Williams

A TEMPLE GUARDIAN OF BENARES

The Nepali temple, built of wood and brick with projecting eaves in the sub-Himalayan type of architecture, seems exotic in Benares. The grossness of certain details of the wood carving have made infamous an interesting temple which adds variety to the three-mile architectural crescent beside the Ganges.

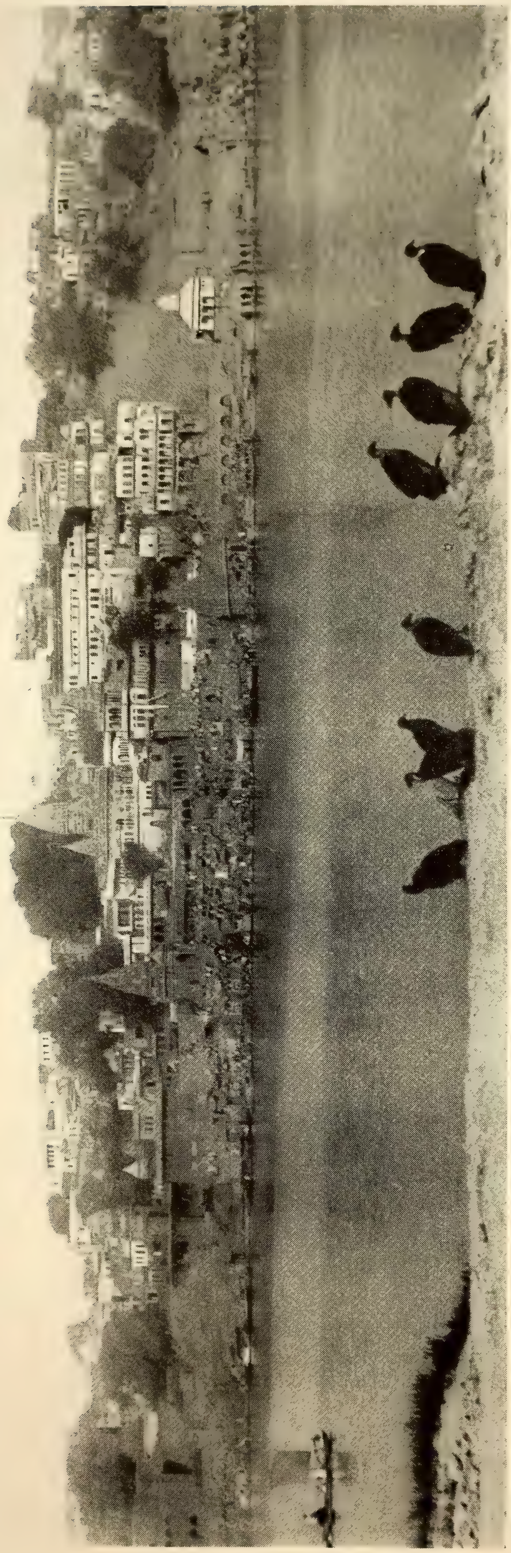
TOURISTS FLOCK TO DELHI

When it comes to visitors, Delhi stands in a class by itself. Benares is a religious edifice with running water laid on. The Mela ground at Allahabad is a hive of Hindu pilgrims. But Delhi attracts great numbers of visitors whose interest is not in temple or mosque, but in the historical buildings of the fortress.

If the crowds I have seen there on two visits to India are fair samples, there is a lively popular interest in the old buildings erected under Shah Jahan. During the entire time that the buildings are open, bright-colored crowds of natives follow Indian guides from place to place and listen attentively to the lectures.

Those of us who think of India as a tourist land should not make the mistake of picturing every interested traveler as a helmeted foreigner with stentorian shoes. Much more fitting to these scenes of past splendor, when the Peacock Throne stood in the Hall of Public Audience and when the private rooms echoed to the laughter of graceful brown women disporting in white marble pools, are the Indian women whose high-arched feet caress the smooth floors and whose jingling anklets and swishing skirts edged in gold braid suggest the glory of the olden times.

The Hall of Private Audience in the Delhi fortress is not only the most splen-



Photograph by Maynard Owen Williams

THE AFFLUENT VULTURES OF KASHI

Benares well merits the name of "splendid" when seen from a distance, for the half moon of imposing ghats is most impressive. But the vulture adds a note to the scene which suggests the sordid filth which lies behind the towering piles of the waterfront or floats in the sacred waters of the holy river (see text, page 463).

did interior outside the Library of Congress, but is also a great help to writers. The Persian poet once said of this room:

"If Paradise can be on the face of the earth, it is this; oh! it is this; oh! it is this." Which is ample indication that early poets, like the author of Lalla Rookh, were paid by the word, and few indeed are the writers since who have overlooked this redundant money-maker.

LIFE IN A BULLOCK-CART CAMP

One who goes outside the present city of Delhi to the site of some former or future capital is almost sure to come upon a bullock-cart camp. On primitive ovens the women bake bread while the men sit around and smoke or lie corpse-like under quilted blankets. Children play around the high wheels, and under the heavy body of the cart a baby may be seen sleeping in a hammock.

The costumes seem to be chosen to contrast with the arid earth. Sunbursts of red and orange bear blinding gleams where tiny mirrors have been worked into the pattern, and the diminutive bodice is decorated with bright green and blue.

Big feet and a silhouette suit don't go well together; but even the capable feet of an Indian peasant woman borrow grace from a skirt so full that when laid out on a hillside to dry it looks like a very fat doughnut with a very small hole for the waist.

Along the roads outside Delhi in winter one will see patient donkeys with barelegged drivers who look for all the world, or at least two thirds of it, like Syrian muleteers skirting the Lebanon.

WHERE INDIA'S CAPITAL IS BEING BUILT

So many capitals have risen and fallen above the dusty plain between the present Delhi and the Kutb Minar that some feel that the Government of India has gone out of its way to tempt fate. The buildings of the new capital are to be immense. After we had lost our way among the substructures of the wide-stretching pile, my companion, a government official who lives near by, discovered a Court of Victory filled with enough German guns to have reduced Verdun had it not been for French valor. He admitted that this great space was new ground to him.

It must be as hard for officials of the Government of India to go out from the attractive city to this dusty plain as it was for the American federal officials to follow John Adams from pleasant Philadelphia to the wilderness which was to become the city of Washington.

To me, the most interesting structures on the new Durbar site belong to the building-block school of architecture, and any four-year-old could copy them with complete success. The wide plain at Delhi is swept by hot winds charged with dust, and if these thousands of brick wells succeed in protecting the tiny trees which they inclose, these unimposing piles which mark out the future roads may prove more useful than the Durbar Hall itself.

If sheltering trees can be made to grow along these branching avenues, they may come to rival the cryptomeria avenue at Nikko or the poplar portals to the capital of Kashmir. How few are the builders who have planted trees and encouraged Father Time to coöperate with them instead of letting him pick away with feeble but persistent fingers at decaying piles of brick and stone.

AT AGRA, IN THE SHADOW OF THE TAJ MAHAL

It is hard to leave the lovely fort, the imposing mosque, the colorful river bank, and the lively Chandni Chauk, to say nothing of the scenes connected with the Mutiny. But Agra lies ahead and even Delhi must give way to the Taj Mahal.

All that I can say about the Taj Mahal has long since been said. Its loveliness, enhanced by green gardens and mirror-like water-ways, makes it impossible to describe. Pages of type only prove the futility of words to visualize it. One approaches it across a golf course, and the spell which the incomparable structure has, even over those long familiar with it, can be understood when I say that golfers have been known to take their eyes off the ball when driving in the direction of the Taj dome. Never was there a better or more beautiful alibi for indifferent play.

Visitors to the Taj are marvels at memorizing, and on a busy day one can hear the same sentence repeated from four sides at once; but it took a woman to show how futile is the task of memorizing specifications.

On each corner of the main platform stands a white marble minaret with three balconies. Several times I heard one man speak of the symmetry of the tomb, of the ground, of each detail. To hear his enthusiasm over the perfect balance of the place, one would suspect him of being one of those ambidextrous artists whose right hand knows so well what his left hand is doing that it can exactly imitate it.

TESTING THE SYMMETRY OF THE TAJ

I caught up with them later, when we were on the second of the three balconies of one minaret. He was leaning outward over the low balustrade, hanging onto his hat and looking upward to see how much more he would have to climb to reach the top. It was a risky piece of acrobatics and evidently his wife feared for his life. The marble platform, ninety feet or so below, looked hard.

"Henry, didn't you say that these grounds were perfectly symmetrical?"

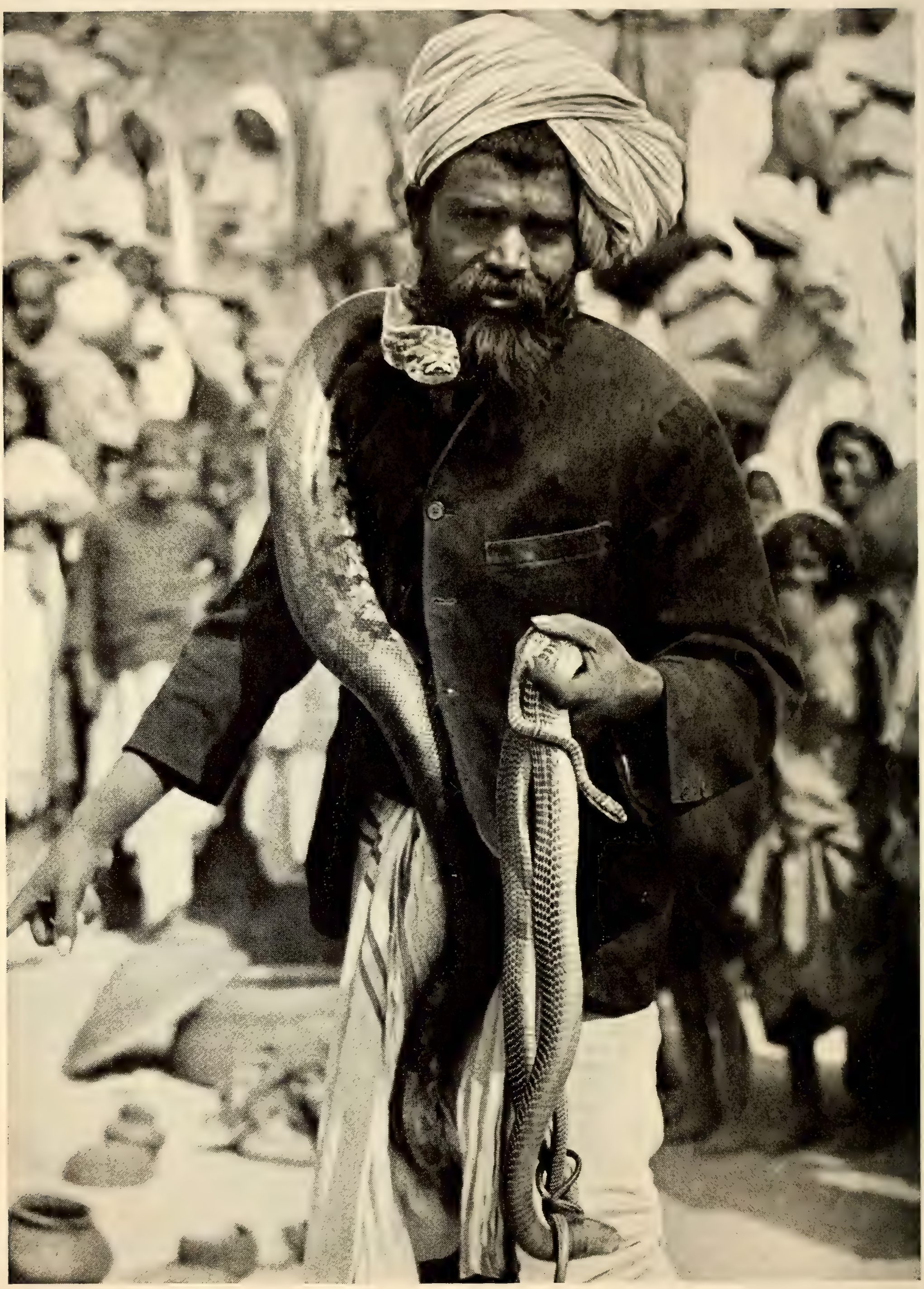
Red faced from his bending, the husband glared at his patient wife, but managed to keep his voice respectful.

"Yes, my dear. Everything here is symmetrical."

She pointed to a twin minaret across the platform.

"Then, why don't you judge the distance to the top of this one by comparing it with that one over there?"

Lovely as is the Taj, fairylike as is the view of it from the fort in which his son Aurangzeb imprisoned Shah Jahan, beau-



Photograph by William W. Chapin

A SNAKE-CHARMER OF BENARES

As though they would add to the gruesome effect of the holy city of Kashi, there are always snake-charmers to be found along the bathing ghats. Not only snakes but scorpions and other gentle pets are proudly exhibited to the curious.

tiful as are many of the buildings which make the Agra citadel a mahogany-colored jewel-box, filled with bright baubles, I was much impressed by the tomb of Itimad-ud-daula, father of Nur Jahan, whom Moore made famous as Nur Mahal. Here marble is used for screens which rival in delicacy the ancient filigree jewelry of Greek and Etruscan goldsmiths.

Sunset and evening star furnish the soft light which bathes the Taj Mahal in a fairy glow, but it is the splendor of the moon that makes the hotel business of Agra fluctuate like a lunar see-saw. Nearly every one wishes to see the famous mausoleum at the full of the moon, but he who is not susceptible to the glory of its light can well afford to plan his stop in Agra at a time when its lure does not force him to share a tent instead of monopolizing a comfortable room.

To add to or deduct from the Taj Mahal would seem blasphemy; but Lord Curzon achieved the miraculous. Above the twin tombs of the world's most monumental lovers there swings a lamp from Cairo which the English Raj caused to be hung in the matchless mausoleum in memory of the woman who was his own Mumtaz-i-Mahal.

As one steps from the bright moonlight into the yawning darkness of the great gateway, he sees a tiny light set in the ethereal face of the world's loveliest building. Instinctively one repeats the Shakespearean simile: "So shines a good deed in a naughty world." Brighter than the radiant marble tomb which frames its golden glow, this spirit-lamp sends forth its gleams to shoot one line of golden glory through the silvery fabric of the peerless perspective of green gardens. There, lightly hovering above the marble cenotaphs of Shah Jahan and the "Pride of the Palace," his beloved, the seraph flame shines like the sweet soul of Arjmand Banu, who, loving much, was loved so well.

ALLAHABAD DURING A FAIR

Allahabad is ordinarily an uninteresting city; but during the mela it takes on the odor of sanctity and dust because of its position between the two great rivers, the Ganges and the Jumna.

Once a year the Magh Mela is held. Once in twelve years the Kumbh Mela buries the sands of the alluvial plain beneath a flood of human beings. A mela is a religious fair, but mêlée is as good a word. At the annual fair the number of pilgrims on a given day is only a quarter of a million; but in 1930, if all goes well, a million and a half pilgrims will come hither to stir up the fine dust, skid through the slippery clay, and bathe in the chocolate-colored waters of the sacred rivers.

NO CARRIAGES ALLOWED

During a mela the whole countryside is placed under strict control. No carriages are allowed in the grounds. Sanitation becomes, pro tem., a serious matter. Photographing is forbidden, without special permission and a bodyguard.

Before the January fair takes place a village of rush shelters springs up on the low shore, which the receding water has left parched and cracked into great squares. Flags, which may or may not mean anything more than display, but upon which most of the *dramatis personæ* of Mother Goose and the Jungle Books appear, rise on bamboo poles whose assertion of individual independence gives an inebriated look to the row of fluttering pennants. No two have the same slant. A corn field is a miracle of geometric precision compared with this awkward squad of waving flags.

Holy men, dressed in a gray coat of ashes, chat with one another or sit in silent meditation, while others, sheltered from the fierce sun by a rush screen or protected by a cloak or blanket hung to sunward, chant psalm after psalm from their holy books, wedged like a Koran on a small stand, while they accentuate the monotony of their tones by strumming on a musical instrument which seems to be a hybrid of mandolin and soup ladle, much the same type of instrument that one finds, far away across Persia, pictured on the ancient Hittite ruins on the upper Euphrates.

Yellow-faced gods in groups of four or six spread their tawdry silk skirts in mute appeal for largesse in coins of microscopic value. Over the whole ant colony of massed humanity there hangs a yellow dust cloud stirred up by myriads

Photograph by William W. Chapin

INSULT HARNESSED TO THE INJURED

The camel is accustomed to burdens. Without the twin loads which flank his sides the desert carrier seems gaunt and unimpressive. But to harness him between thills like a horse or a Belgian dog is the last indignity that breaks the camel's pride.

of bare feet and awkward slippers with huge hanging tongues. Stooping street-sprinklers with swollen water-skins weave back and forth, rescuing a wide roadway from the dusty strand which in summer is hidden beneath the murky waters of the sacred rivers.

Out beyond the line of religious boats, each with its tinsel shrine, the pilgrims seek the place where the cleansing flood of the Jumna enters the sacred Ganges, and coffee-colored rivers make a coffee-colored people whiter than snow — in their own estimation.

Like other religious fairs, the Megh Mela at Allahabad is a mecca for money-makers, and the principal thoroughfare is lined with mat-shed shops for the sale of sacrificial brassware, tiny brass idols, holy berries made into dark necklaces, and shining brass water bottles, zoned with mellow-tinted copper, in which holy water can be taken to remote parts of India by credulous people. Here and there one finds men with small furnaces full of heated pitch, sealing the water vessels so that not a germ or an atom of holiness can escape.

I had entered the grounds with my camera without knowing that photography was forbidden, and near the river I came upon an old man upon whose time-furrowed face many cabalistic signs were painted.

He was reluctant about having his picture taken. Then a policeman came up and said that photography was forbidden.

Evidently the modesty of my time-honored friend had been false or assumed, for at this sign that he could not have his picture taken he began to rail at the policeman in terms which defied, but did not require, translation.

Being endowed with an American respect for agents of law and order, I started to put up my camera; but by this time a crowd had gathered and it was evident that the cabalistic signs on the pilgrim were far more potent than any symbol of police authority, and not only were the three policemen who had joined the first officer overruled by the pilgrims, but I was urged to take the old man's picture under the very eyes of those who sought to prevent it. Verily, the holy man is a force in India, especially at such a time and place as the Megh Mela at Allahabad.

BENARES, A CITY OF PERPETUAL PIETY

From Allahabad to Benares is a step from periodical pilgrimage to perpetual piety. Benares is enough to sicken a surgeon. Mark Twain has described it so truthfully that subsequent writers have had the choice of quotation or paraphrase.

It is a city of narrow streets in which the heavy scent of jasmine flowers becomes a stench and the holiest spots foul retreats. Luckily, there are a few places where the foreigner is not allowed to enter. But the sight of flower-decked bulls crowding spindle-shanked children from the streets is enough to remind one that he is in a land where human life is cheap, but where a riot may be started by the killing of peacock or pigeon or monkey.

Photograph by Maynard Owen Williams

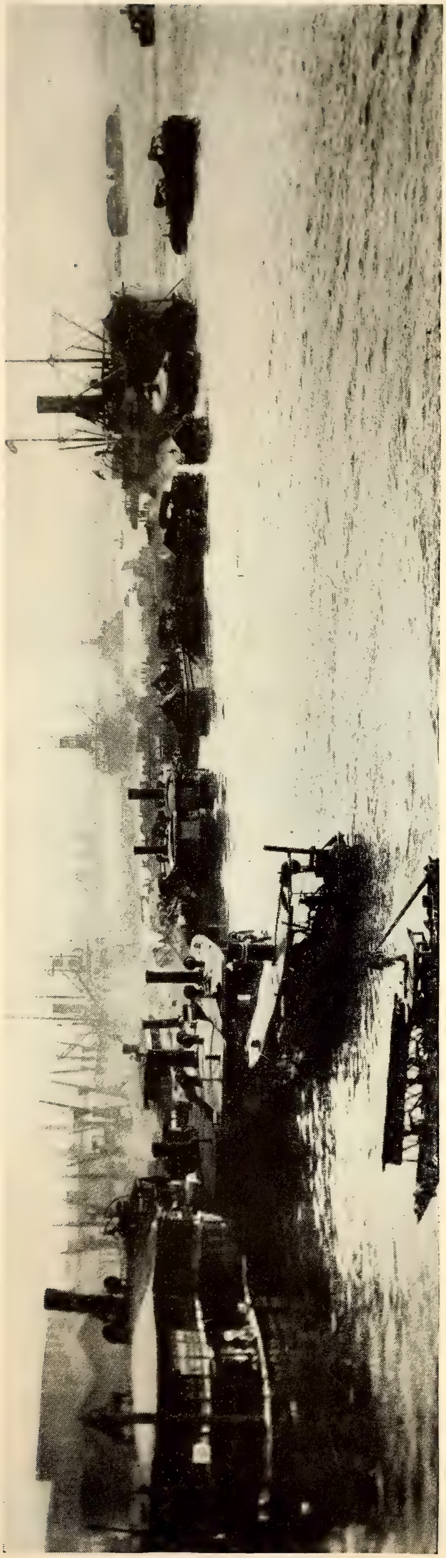
THE BURMESE SMILE IN AN INDIAN SETTING

At Buddh Gaya, whither Buddhists flock from many quarters, the merry smile of the Mongoloid Burmans can always be seen. The two young nuns had just been initiated and the one in the middle still felt the responsibility (see text, page 465).

Benares is a crescent waterfront on a filthy stream backed by a malodorous city. According to Mark Twain, a self-respecting germ won't live in Ganges water, but this does not prevent the people from bathing in it, drinking it, washing their clothes in it, and tossing half-burned bodies into it, to float about in the backwaters around some ruined masonry until flood carries them down the stream.

Across from the city is a low plain of soft sand, along whose shoreward edge a row of vultures can often be seen. They are lazy beasts. A vulture's life in Benares is too easy and opulent to be admirable.

For three miles the river front is lined with a succession of ghats and palaces which make it a vision of beauty. Travelers usually embark on small boats which are rowed up and down the Ganges, giving intimate views of the bathing and other activities. From this vantage point the city is of surpassing interest.



Photograph by Bourne and Shepherd

ALTHOUGH SITUATED 82 MILES UP THE TREACHEROUS HOOGHLY FROM THE BAY OF BENGAL, CALCUTTA IS INDIA'S CHIEF SEAPORT

My first visit was in the heat of summer, and the swollen Ganges lapped the fallen masonry and threatened to tear us away from the scene; but in winter the ghats or stairways where the bathing goes on are much higher and more impressive and the river is easily navigable with little effort on the part of the oarsman.

A POPULAR PLACE IN WHICH TO DIE

Benares is a popular place in which to die. Thousands of Hindus arrive with one foot in the grave, happy to be able to put the other into the sacred river until death comes to bless them who die here. Funeral fires are always burning, not only on the regular burning ghat, but at other places along the stream. The procession of corpses seldom ends. Embers from the pyres drop like lava on the native sweets and fruits which are sold along the roadways.

Occasionally there is a happy touch to the scene. On one occasion I saw two young women, who by any standard would be called beautiful, stepping down into the brown flood, which harmonized well with their satin-skinned bodies; but just behind them came several widows with shaven heads and shrunken breasts, their whole bodies bleached as though widowhood were an anemic disease which robbed one of health as well as happiness.

The widows who come to the Benares ghats are almost convincing arguments for suttee or progress. Caught between the two millstones of a law which makes their death on the funeral pyres of their husbands criminal, while it does not save them from unending bitterness, they can well curse the lot that has been forced upon them and pray that Mother Gunga will some day understand and take them to her swelling bosom.

Benares is famous for its brasswork and its kincobs or *kamkhwabs,* resplendent silken fabrics woven with gold and silver thread, thus becoming veritable cloth of gold. India is using less of these fine textures, but it would seem that the West might adopt them for many things. A handbag of Benares brocade surpasses in loveliness the best bead bags that I saw in the luxury shops on Kartnerstrasse in Vienna.

The West is never tired of ascribing to the East different standards of thought and action from our own. For the Westerner, this difference is all in his favor. I owe my possession of a lovely Benares scarf to the flexibility of personal contact, in which the West is so lacking.

SHOPPING WITHOUT FUNDS IN BENARES

Heavy expenses and difficulty in the transfer of money left me almost penniless in Benares. Had my time been longer, this would have been anything but a calamity. But my schedule was made up in advance and the banks, in spite of enough official letters to choke a mail-box, could advance no funds.

The most prominent firm of silk merchants in Benares had earlier offered to let me have some goods, for which I could pay them when my money arrived. It was Saturday, and to wait for the bank to open on Monday would disarrange my plans; so I went to the silk store, told the manager that I had no money and no checking account in India, but that I would purchase a better scarf than I could afford if he would advance me enough money for two days' expenses.

The scarf was quickly wrapped up, a generous supply of rupees was placed in my hands, with offers of more if it would help, and I went out into a large world with a gold-thread scarf under my arm, money in my pocket, and a surety that two days had been saved by Oriental dealing.

At the station at Benares the hawkers sell small marble paper-weights reading "God is Love" and "Time is Money." Benares gives strange interpretations to both statements.

At Sarnath, near Benares, Buddha first preached his doctrines. But for present-day Buddhists one must go beyond the Brahmaputra or climb to the Himalayan foothills, except for the small group in the rest-house of Buddh Gaya, near the sacred pipal tree where Sakyamuni gained freedom from the unceasing circle of rebirths. Asoka is said to have erected a temple here in the third century before Christ, but the present pyramidal temple, restored forty years ago, probably does not antedate the seventh century of our era, when the Chinese pilgrim Hiuen Tsiang saw it.

Hindu pilgrims who visit the temple of Vishnupad in Gaya also visit the famous Buddhist shrine, but after Allahabad and Benares, Hindu pilgrims have lost something of their novelty. I found much more interest in the Burman and Himalayan pilgrims who were staying in the rest-house which the Gaya District Board has provided for Buddhist visitors.

ENTERTAINED BY A HIMALAYAN PRINCESS

A princess from the Himalayan borderland was staying there on the day of my visit. Her son spoke excellent English, and together they made me very comfortable; but even more interesting were the young Buddhist nuns, whose shaven heads proclaimed the ceremony they had just completed, but whose laughing eyes marked them as creatures apart from the sullen Indians who live in this region. Buddh Gaya is charming because of its peaceful quiet, just as Benares is interesting because of the constant throb of life and the eternal pall of death which hangs with the smoke of the funeral pyres above the busy city.

CALCUTTA, AT THE END OF THE STREET

After Lahore and Benares, after the gay colors of Amritsar and the dun crowds of Allahabad, Calcutta is of little interest. The docks teem with life in spite of inaction resultant upon the mystery of foreign exchange. There is a race-track more famous than most, and one night I attended the Duke of Connaught's ball in the Government Building, to which a Nepali nobleman with a bodyguard in headdresses heavy with pearls added an exotic note to an affair which was democratic but commonplace.

The district made infamous by the Black Hole is now as imposing with solid-looking bank buildings as any Occidental financial district, and no more so. Kalighat almost, but not quite, reminds one of Benares. The theaters almost, but not quite, recall Picadilly Circus or Times Square. Yet Calcutta, queen city of India, is proud of herself. "Second City of the Empire" is a phrase which is always left in type by the Calcutta papers.

The Maidan at Calcutta is a great breathing space for a breathless city. It has a tall monument that looks like a prodigal light-house which wandered over

Photograph by Bourne and Shepherd

BATHING AT CALCUTTA'S PRINCIPAL HINDU FANE

In Benares the fanatic and ignorant worship with their hearts in their mouths. At Kalighat the half-Europeanized babu worships one of Hinduism's most repulsive demons with his tongue in his cheek. Here young lambs are sacrificed to the destroying goddess, Kali, whose name is revealed in the modern name of India's queen city.

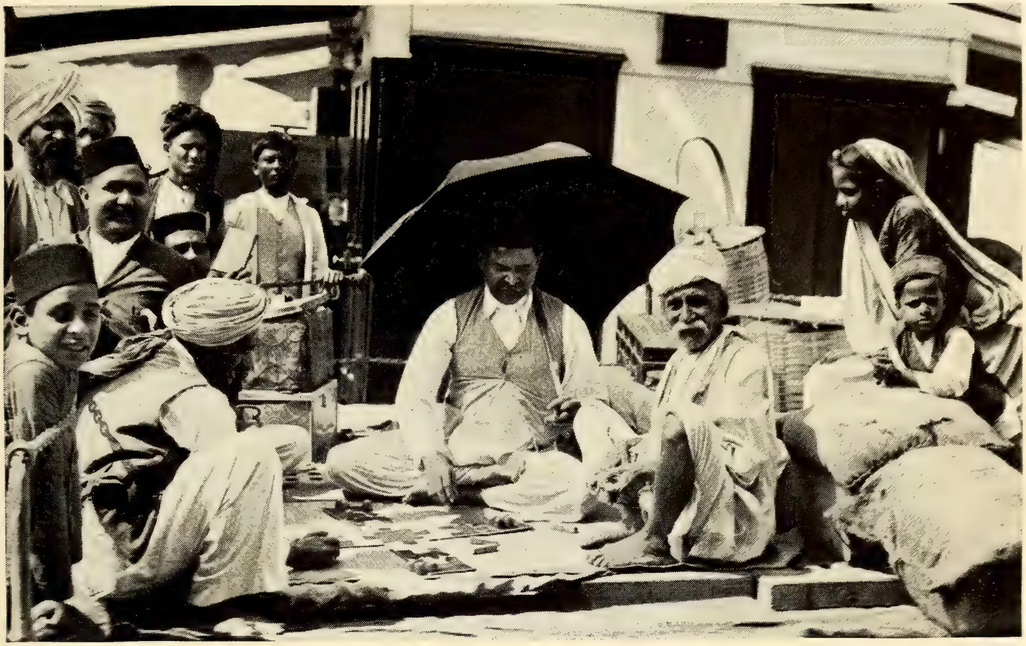
from the Hooghly, and it is the most conspicuous stock farm in the world. Sheep browse here and there, cropping the grass of cricket path or soccer field; goats run about, showing an independence unthought of by their meeker cousins; thoroughbred horses, cared for by picturesque grooms, are led back and forth in plaid blankets; pedigreed pups are cared for by men whose looks would entitle them to more manly labor; pet birds are carried about as in China and fishes are raised in ponds. Only the native babies seem to grow up by themselves.

Calcutta, of all India's cities, has suffered most from commercializing tendencies. Beside the store where Benares brocades are sold, American shoes shine lustrously under electric lights, and close to the curio shop where Tibetan temple treasures are exposed for sale a costly cabaret offers "jazz" to jaded pleasure-seekers.

One hazy morning, before the air has begun to dance in the heat, we slide down the treacherous Hooghly in a spotless little ship, with a sweet-voiced soprano singing in the airy saloon. We pass much shipping, gaily pennoned in honor of the Duke, who is to open a new dock. It is hours before we emerge from the muddy waters of the stream, and our prow piles up crystal cascades against the deep blue of the bounding sea.

Down the coast lies Burma, the land of soft-colored silks and smiles, of elephants piling teak, and the silver tinkle of the temple bells. We lie down, happy in the thought that soon a golden cone spearing the sky will tell of gaily-dressed worshipers surrounding Shwe Dagon.

And after Burma, Colombo, Marseilles, Paris—home. But happy is the thought that we cannot forget the piles of carpets outside Edwardes Gate, the gleam of the golden temple in the balconied streets of Lahore, the Friday worshipers in the Delhi Mosque, moonlight at the Taj Mahal, the hot sands of Allahabad, the bathing ghats of Benares, and the golden



Photograph by William W. Chapin

PLAYING PACHISI ON THE TRIP FROM CALCUTTA TO RANGOON

This is the favorite indoor sport of India. Not every one can, like Akbar, have the court of his *zenana* laid out in a pachisi cross or command the services of purdah ladies as living "men." But even on shipboard, players spread out the varicolored cones and cowrie shells which serve as counters and dice.

trumpet-flowers which match the yellow robes of the Buddhist priests at Buddh Gaya.

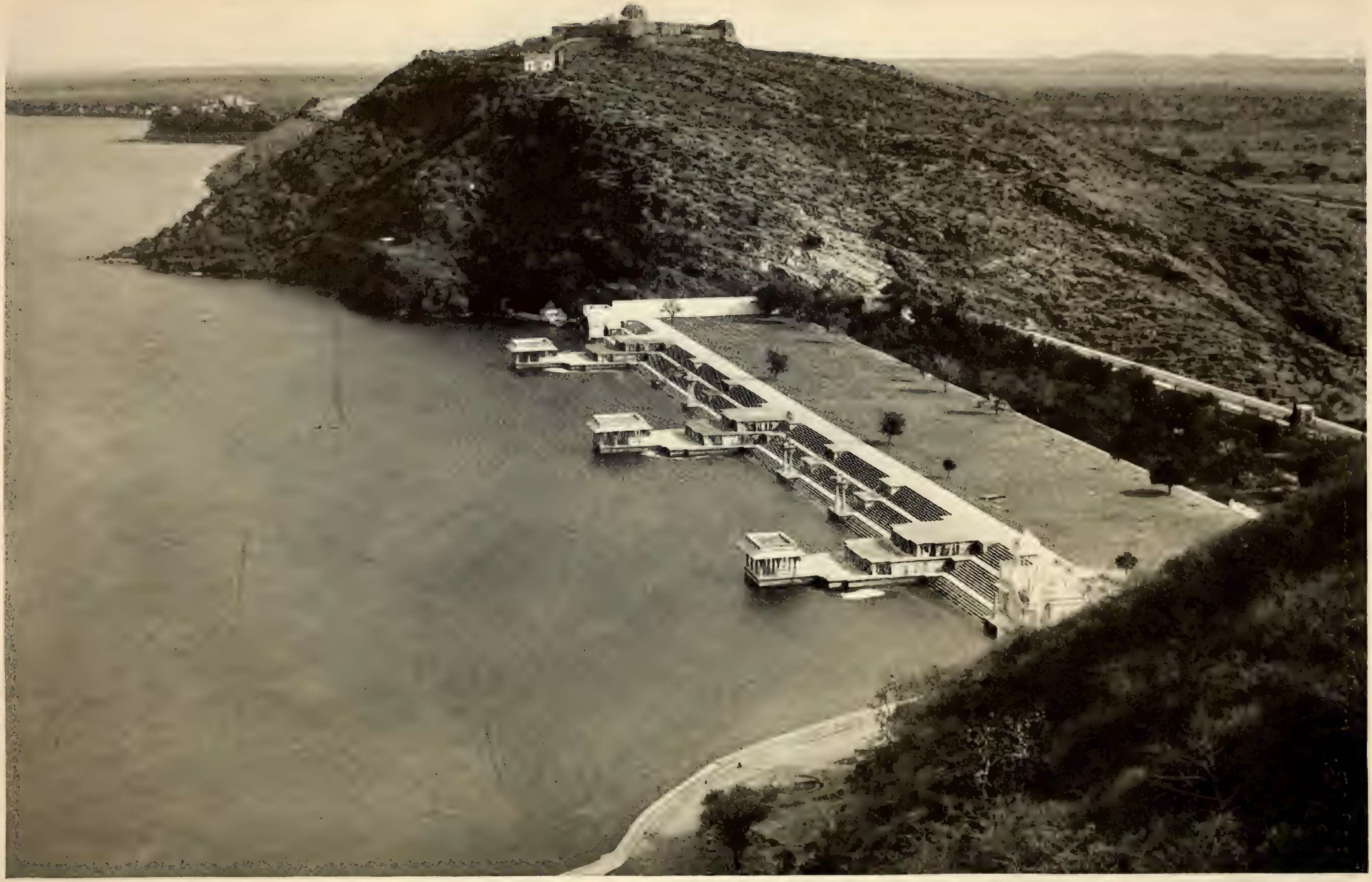
India is a continental stage on which many dramas are constantly being enacted. To the tourist it is an unparalleled spectacle.

One has frequent occasion to think that the vast peninsula is an unbroken succession of dull tones; but the next instant a brown-skinned man, dressed in bizarre tints, radiates color in floods of light or points his brilliance against the dun background like a circus poster on a mud wall. When the grays and browns of countryside and complexion seem most deadly in their monotony, the glint of copper and brass, the shine of silver anklets, the shimmer of silk, the glitter of nose bead or earring breaks in on one's consciousness as insistently as reveille in the midst of deep sleep.

Nor does India depend upon color alone. It discharges sensory stimuli in broadsides. When color is for the moment lacking, there is movement, sound and smell. And behind it all there is the atmosphere, which seems almost tangible in its intensity.

Nine-tenths of India is monotony, lassitude, silence. Yet so compelling is the spectacle that, even when time has dulled the impacts that color and sound and smell have made, one is still reminded of vividness such as one finds in the screeching of lustrous green parrakeets amid the jasmine flowers at Shalimar, when the setting sun has made an upturned cauldron of the heavens and the placid pools become smooth mirrors reflecting a chromatic explosion.

The native seldom has a chance to leave the stage and view life from the gallery or pit. To the great majority, existence is a drama the magnificence of whose setting is obscured by the poignancy of its tragedy. A white-hot sun is the floodlight for a play, with the fickle monsoon as its hero and with famine as the sleepless villain. When the monsoon fails, the horizon of hunger contracts until famine shrouds its victims in an uncanny influence to which the bravest must tamely submit.



A THING OF BEAUTY AND OF USE FOREVER: ONE OF THE DAMS OF RAJPUTANA

The waters of Raj Samand, an artificial lake of great depth, are imprisoned by a marble dam extending nearly three miles. This magnificent engineering structure was erected by Rana Raj Singh in 1661, following one of the most terrible visitations of famine and pestilence known in the history of India. Ten years were required for its construction (see text, pages 476 and 477).

THE MARBLE DAMS OF RAJPUTANA

BY ELEANOR MADDOCK

With illustrations from photographs by the author and by courtesy of Prince Bhopal Singh

TIME is not reckoned in India by years, but rather by centuries, in dealing with the rise and decline of her dynasties, buried one above the other under the restless sands of her five rivers. Yet, in accordance with the cyclic law which sweeps the tide of progress westward, old footways survive, leading back to the "ancient days of art," with signs along the way for those who will stop to read them.

When the first Mohammedan invasion poured into India through the vulnerable passes of the Himalayas, those great guardian barriers of the north, the followers of the Prophet found states and cities inhabited by thirty-six royal races of Indo-Aryans, with a civilization which included a knowledge of constructive and mechanical arts, of cosmic laws, of certain forces of nature and how to use them, much of which has yet to be acquired in modern times.

But, great and powerful as were these Hindu states, they were overthrown one after another when the Moslem hordes swept down upon them. Some, less able to withstand, submitted to their new masters; others, daring anything to escape the barbarians, retreated from their fertile plains to a wild country less tempting to the foemen's greed, bordered on the northwest by the waterless sands of the Great Indian Desert.

RACIAL REMNANTS ESTABLISH "LAND OF PRINCES"

Whoever has traveled in the Bernese Oberland of Switzerland needs no description of the Aravalli Hills of Rajputana, whither, among the mountain fastnesses and ravines, spanned by natural ramparts, the remnants of the thirty-six races retired to escape the hated invaders. Still possessed of vast hidden wealth and resources, they established the different states of Rajputana, or Rajasthan, the "Land of Princes," *raj* meaning royal and *than* a dwelling.

Rajputana may be said to be the heart of India, first because it occupies the central area, and again by reason of its being the exclusive territory of the Rajputs, the proud survivors of the old stock and flower of the Indo-Aryan race. Of the various states ruled by native chiefs and princes, Mewar is known as Udaipur; Marwar as Jodhpur; Amber as Jaipur. Others are Bundi, Jaisalmer, and Kotah, with more of lesser importance.

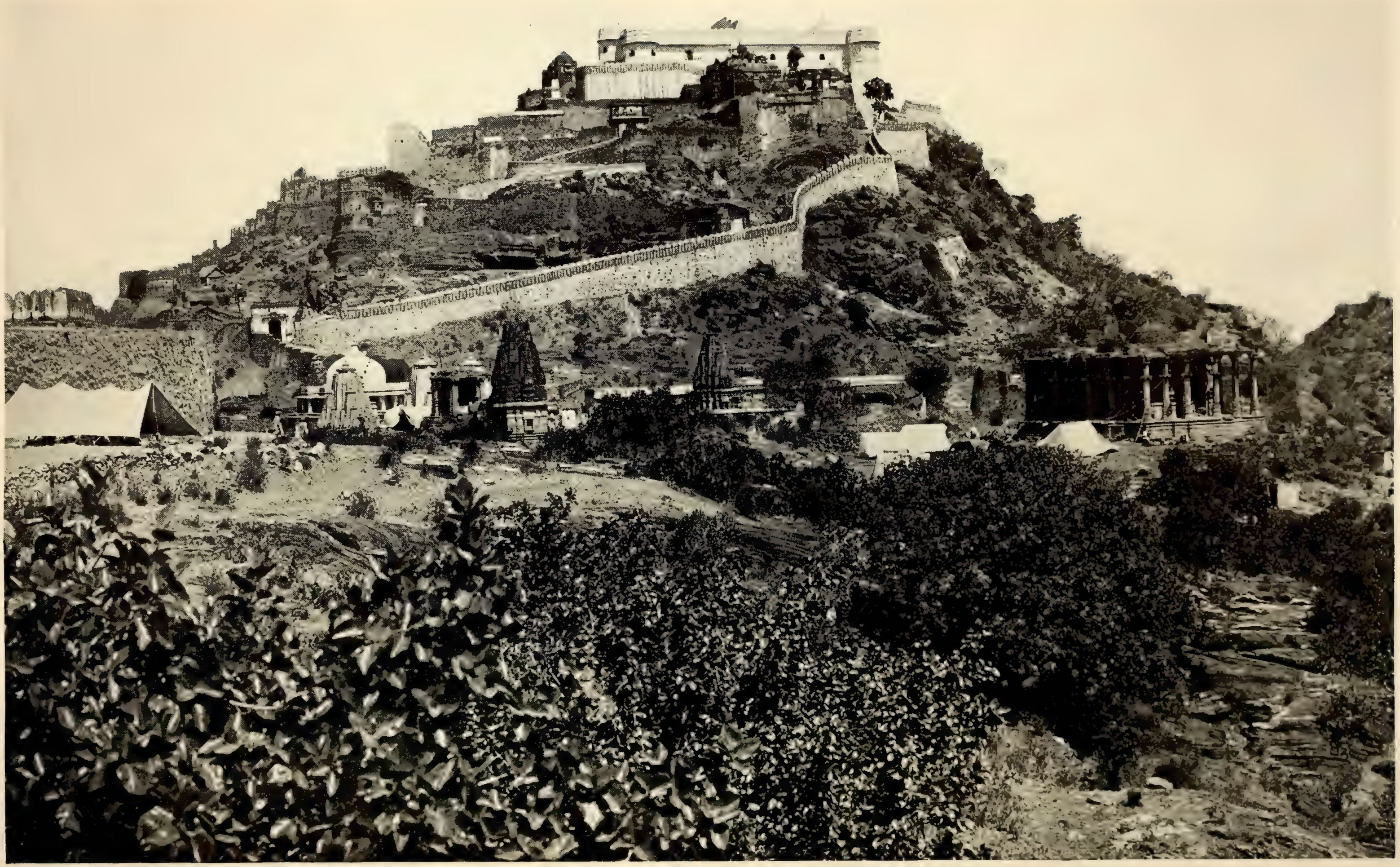
While the Rajputs claim descent through the solar dynasty, the Sesodias, or Gahlots, are the oldest and purest race, of which the Maharana of Udaipur and Mewar is the premier. He is called the "Sun of the Hindus," and by virtue of his exalted family tree, planted by Rama, the deified hero of the Mahabarata, he takes precedence over all the maharajahs, princes, and chiefs of India and is the only one bearing the title of Maharana. In Sanskrit, *Maha* signifies great, and *Rana* was the title used by the old Sesodia kings.

RAJPUTANA, THE COCKPIT OF INDIA

Rajputana was drenched with blood during the wars fought by the Rajputs to preserve their lands, purity of race and their women from the Mohammedans, who by this time had overrun nearly the whole of India.

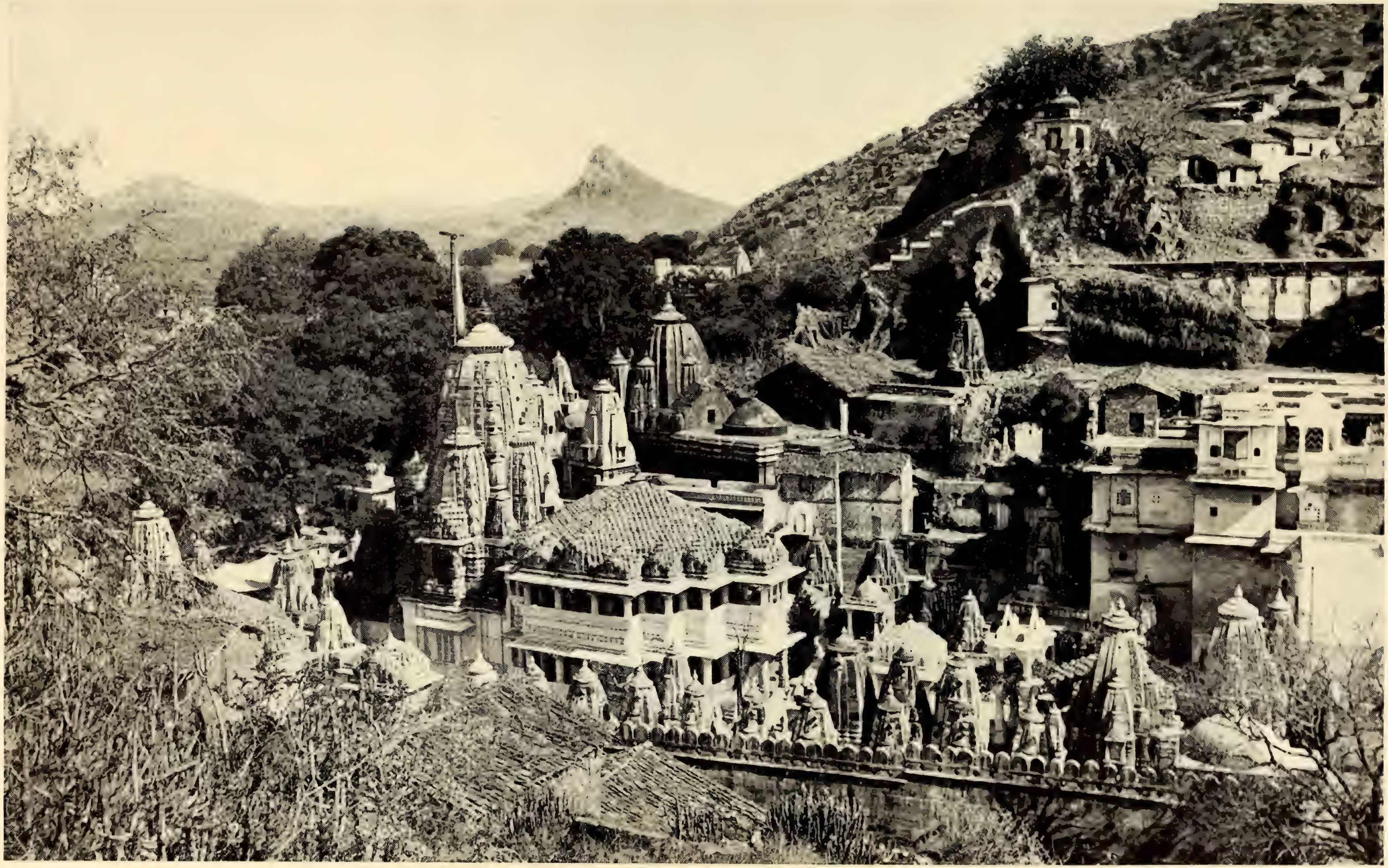
James Tod has told the story in "Annals and Antiquities of Rajasthan," to whom Rudyard Kipling alludes in "Letters of Marque," saying: "If any part of a land strewn with dead men's bones has a special claim to distinction, Rajputana, as the cockpit of India, stands first. . . . The tangled tale of force, fraud, cunning, desperate love, and more desperate revenge, crimes worthy of demons, virtues fit for gods, may be found by all who care to look in the book of the man who loved the Rajputs and gave a life's labor in their behalf."

Mewar, though the most important of the Rajputana states, is the least known



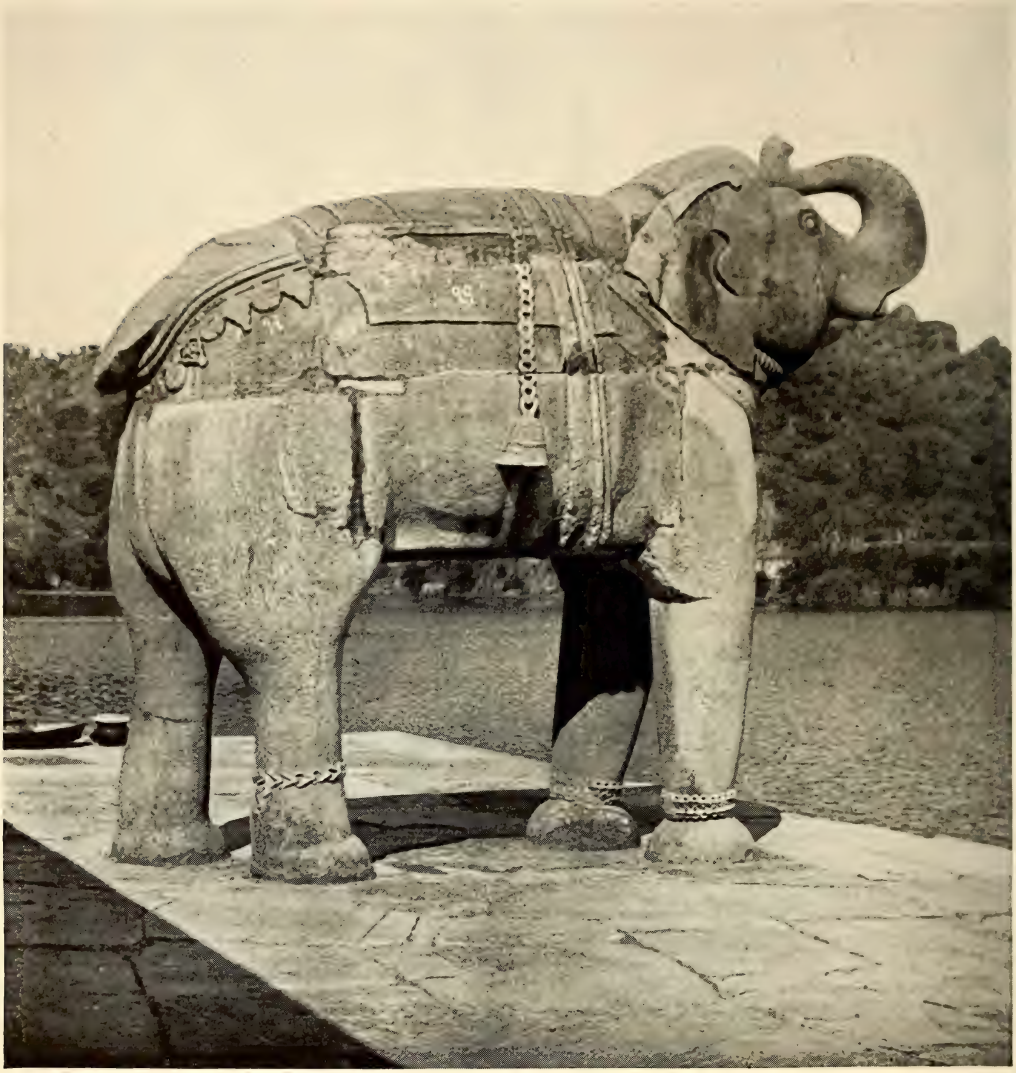
KOMULMIR, CHIEF OF THE THIRTY-TWO FORTRESSES BUILT 300 YEARS AGO BY RANA KUMBHA

Bastioned walls of enormous strength wind and double around the hill until they surround the Cloud Palace at the summit. Secret chambers, treasure vaults, and reservoirs for storing water are hewn out of the solid rock. Notable sieges and battles between Rajputs and Mohammedans centered here, as did also the episode of the "Rajput Nurse," immortalized in Sir Edwin Arnold's poem (see text, page 480).



THE TEMPLE OF EKLINGI, WHICH, ACCORDING TO A HINDU SAYING, "LIES LIKE A TONGUE BETWEEN THIRTY-TWO TEETH": RAJPUTANA

This ornate structure represents the accumulative work of a long line of the "Sun Born" kings. The countless number of "lidded" pyramidal edifices are all of white marble, sumptuously carved, with no two alike, yet all conforming in general outline (see text, page 479).



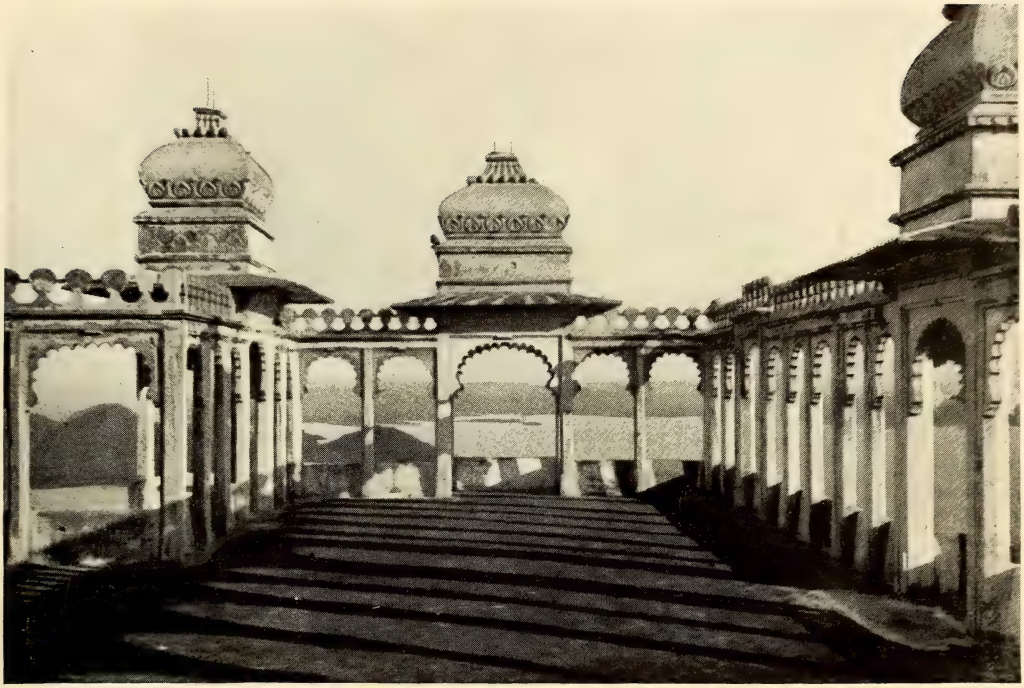
ONE OF THE MARBLE ELEPHANTS ON THE JAI SAMAND DAM

The sculptor has depicted the great beasts with upraised trunks trumpeting to the rising sun.

to European travelers. Yet it contains some of the chief wonders of India. The white marble lake-palaces of Udaipur are unsurpassed. The sculptured ruins of its old capital city of Chitor, covering the top of a sheer rock ridge, four miles long and four hundred feet high, shaped like a monster dreadnaught, are unlike any others, in a land where interesting ruins are common.

Locked away in the Aravalli Hills are marble palaces, temples, and fortresses set on their topmost peaks, with two artificial lakes held by great dams of pure white marble, which very few men and only two European women, according to local tradition, have ever seen.

You can travel from Bombay to Delhi without change, skirting the borders of Rajputana, but if you glance at a map you will notice that there is only one railroad in the state of Mewar. It is a single track, narrow-gauge line which branches off the main line at Chitor and runs to Udaipur, a distance of 69 miles. Apart from these two places, Mewar is inaccessible to travelers, except through the courtesy of the Maharana of Udaipur.



THE MARBLE ROOF LATTICE ON THE "WIND PALACE" OVERLOOKING JAI SAMAND

Here the ladies of the *zenana* (seraglio) could "eat the air" without their veils, and here Jai Singh used to sit and study the constellations. He built the "Pink City" of Jaipur, which also has a wind palace and a strange old astronomical observatory.

Each year His Highness makes a trip into the Aravallis to worship at the shrine of his ancestors, at Eklingi, and for the *shikar,* or shooting, accompanied by an entourage including bullock-carts and camels carrying tents and provisions, a small army of servants, and courtiers riding elephants, and the celebrated Arabian horses of Kathiawar, "with mouths that can drink out of a teacup."

A VISIT TO THE "SEA OF VICTORY"

When my husband and I were state guests at Udaipur recently, we accompanied His Highness on such an expedition. We went first to Jai Samand (the Sea of Victory), or Dhebar Lake, an artificial body of water ninety miles in circumference, with innumerable lagoons winding among low-lying mountains.

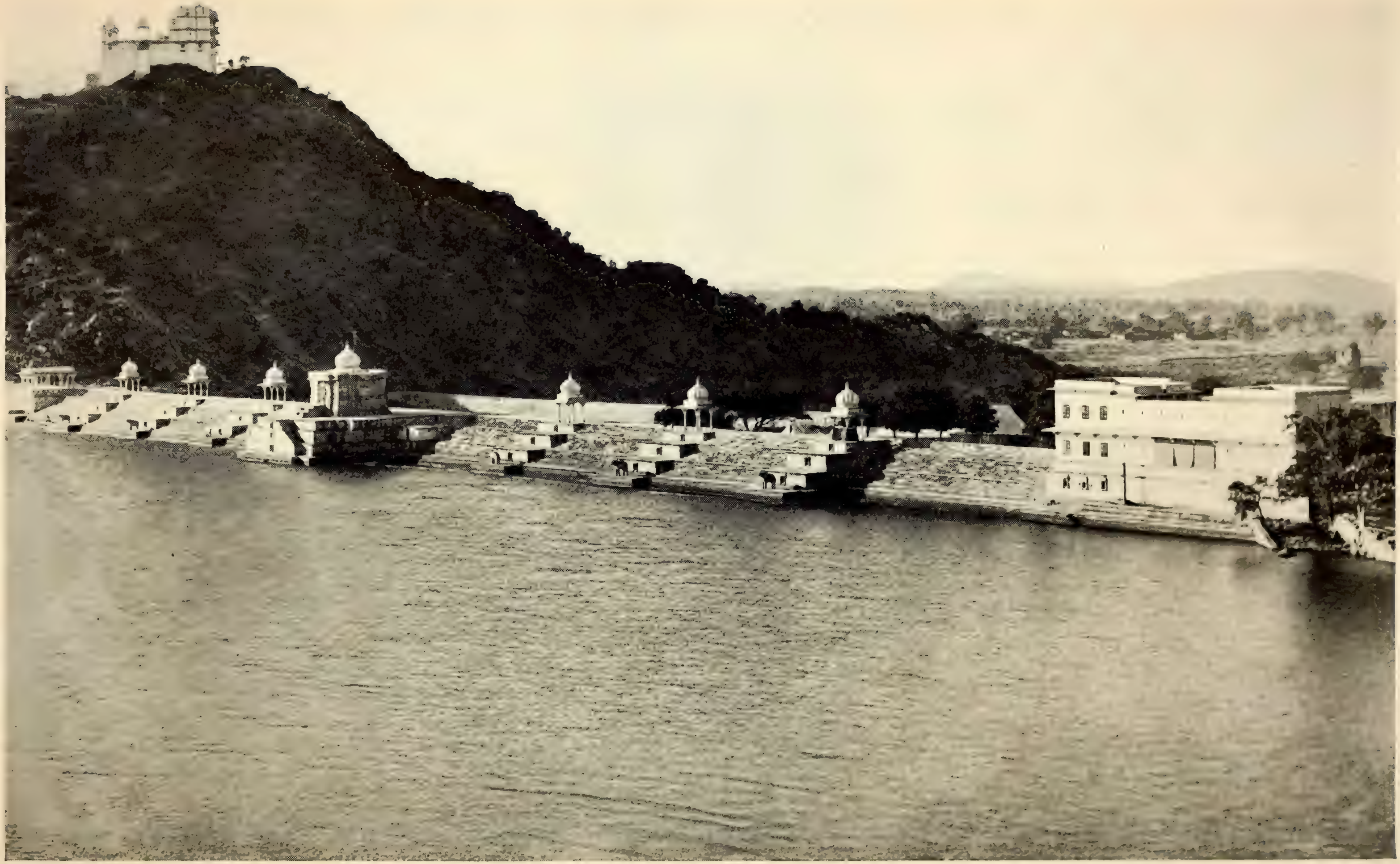
This lake has been slowly filling and extending for two and a half centuries, ever since Jai Singh, the Rajput king who built the "Pink City" of Jaipur, imprisoned a mountain stream behind a colossal dam over 1,000 feet long, with flights of white marble steps extending the entire length to the water's edge. Along the top are fairy-like pavilions, with a temple and summer-house at each end. On jutting buttresses six half-sized marble elephants, with ceremonial trappings, stand with raised trunks, as if trumpeting to the rising sun (see p. 472).

On a height of 700 feet overlooking the lake, Jai Singh set up a three-storied marble palace surmounted by open-arched pavilions. On the face of the three stories are exquisitely carved overhanging balconies, set so close that their projecting roof-slabs touch (see p. 474).

THE WIND PALACE, A PLACE OF SONG AND SCIENCE

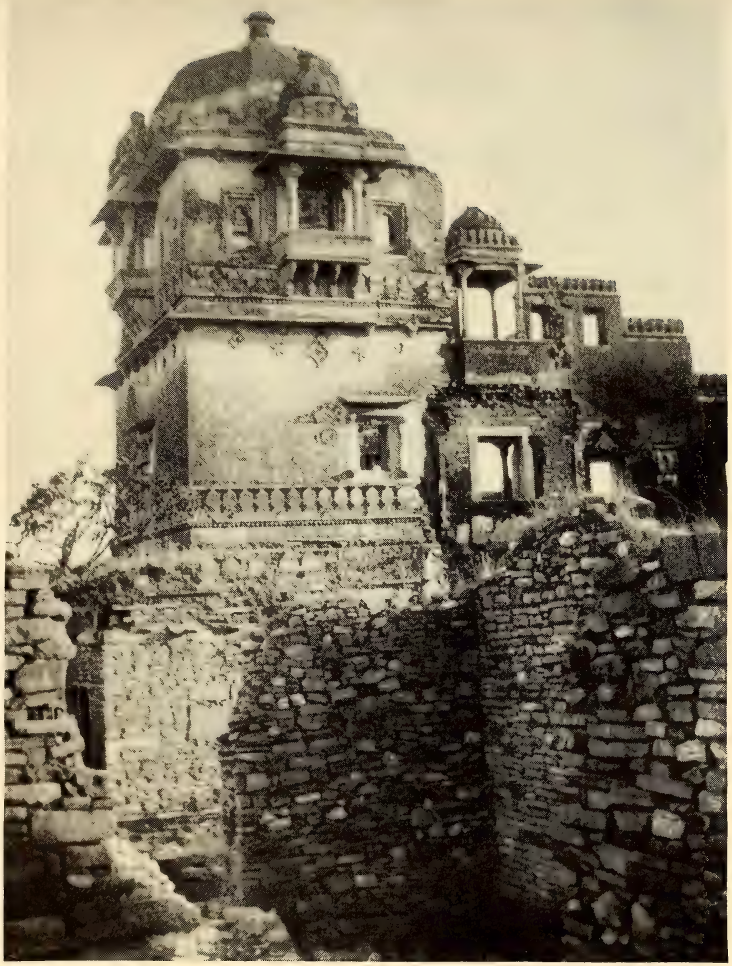
On the crest of another mountain, situated where it cannot be photographed and accessible only on an elephant or on horseback, by a winding corkscrew road, is another three-storied white marble structure, that at once suggests what it is—a splendid royal *zenana* (seraglio), with an expanse of glistening walls set with small pierced marble grilles.

This is the "Wind Palace," which Jai



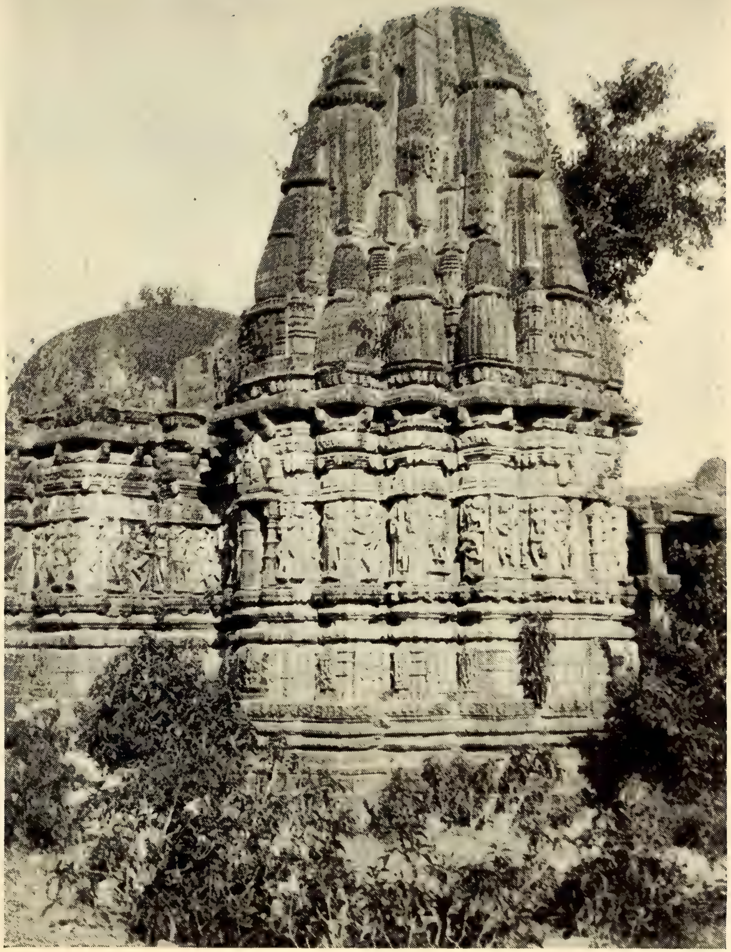
THE WHITE MARBLE DAM AT JAI SAMAND

This artificial lake was formed two and a half centuries ago, when Jai Singh, the Rajput king, impounded the waters of a mountain stream. The marble palace, on a height 700 feet above the dam, is surmounted by open pavilions and projecting balconies. Jai Samand is over ninety miles in circumference, including its winding lagoons, and is one of the largest artificial lakes in the world (see text, page 473).



THE KING'S PALACE AT CHITOR

At the left of the foundation is partially visible the sealed opening to the subterranean rock vaults where thousands of Rajput women, at the third sack of Chitor, destroyed themselves rather than fall into the hands of the Moslems (see text, page 498). Legend says that when the city finally fell the infant son of the slain Raja was saved from destruction by his nurse, who loyally substituted her own child for him.



A JAIN TEMPLE AT CHITOR DOOMED TO DESTRUCTION BY A TREE

When the first twig of the sinuous Peepul (sacred Bo Tree) worms its way through the walls, a structure is doomed, as the rending power of its insidious growth is tremendous. This Jain temple, one of the oldest in Chitor, has a healthy parasitic tree growing inside and already a portion of the beautiful pyramidal dome has been torn away, the destruction of the remainder being only a question of a few years.

ONCE THE DWELLING-PLACE OF PRINCESSES

Although an empty shell, the sheer, unscalable walls of this old royal *zenana* at Chitor are so well preserved that one might almost expect to see the flutter of a silken sari or gleam of golden ornaments from the balconies.

Singh is said to have built for Rani Comala, his queen, but it is more probable that it was inspired by his romantic passion for a "nightingale-throated" Kashmiri girl and his researches in astronomy. The roof court of the Wind Palace is surrounded by a lofty open lattice, where the exclusive *purdah* ladies could "eat the air" without their veils—an ideal spot, too, for studying the constellations while listening to the sobbing music of the old-world *vina* swept by henna-stained finger-tips and to the soft swish of the silken screens flung outward to the night breeze.

It requires the poetic imagery of the East to depict these dream palaces, which, although swept and garnished by caretakers, have stood empty for a hundred years. Their wild, uninhabited surroundings, with range upon range of hills melting into a sapphire haze, and their ethereal situation between earth and sky, render detailed description flat and colorless. Seen from a distance, in the vivid radiance of an Indian moon, the lattice arches gleam like windows of carven pearl reflected and magnified in the pellucid waters of the lake.

Jai Samand, because she lures and tricks the beholder by phantom mirages, is called the "Face of Mewar"—a face that photographs itself forever on the memory.

RAJ SAMAND, A BEAUTIFUL COMPANION LAKE

Only twenty-five miles from Udaipur, yet a day's journey on horseback or by elephant across wastes of pink sand strewn with boulders of rose-veined marble and dusty thorn cactus, is Raj Samand, another artificial lake, the munificent work of Rana Raj Singh at a cost of $5,000,000, and this, too, at a time when labor was cheap and the material lay in convenient quarries. Like Jai Samand,

A PORTION OF THE TEMPLE TO BRAHMA AT CHITOR

This magnificent pile is recognized as one of the most beautiful specimens of pure Hindu carving in India.

its waters were gathered from a mountain stream, and, while not as large in area, it was a far more stupendous achievement.

The enormous pressure, due to the great depth to which the water would eventually attain, must have been foreseen, as the Raj Samand dam forms an irregular segment of a circle, extending for nearly three miles. It, also, is of white marble, endless tons of it, all faced and polished. It is buttressed by thick ramparts of earth, which, had the builder lived to complete the work, would have been planted with flowering trees to form a promenade.

Here three terraces of steps descend to the water. On the lower tier rise four graceful and elaborately carved Hindu arches, of a peculiar and distinctive design. Dividing the expanse of steps, six broad platforms inclose cool twilight spaces underneath. Marble terraces extend out over the water, supporting three twelve-pillared pavilions, where royalty used to sit after the bath (see page 468).

A walled fortress, with the dome of a white palace rising from the center, crowns a sloping flat-topped mountain above the dam. At its foot is the temple of Kankroli. Its position in the somber shadows of overhanging rocks detracts from its actual size and dignity, yet not from its importance as the shrine of Hanuman, guardian and protector of the dam, a startling four-faced and many-armed statue of Agra marble highly decorated in gold and colors (see p. 478).

BUILT TO RELIEVE A STARVING PEOPLE

Lake Raj Samand, including the temple, was a famine work which took ten years to build. But, magnificent, costly and useful as it is, it derives its chief beauty from the compassionate motive of the king to relieve the misery of a starving population, and to render impossible for all time another such visitation of famine and pestilence as swept over Mewar in 1661,* during the first years of Rana Raj Singh's reign.

A literal translation from the chron-

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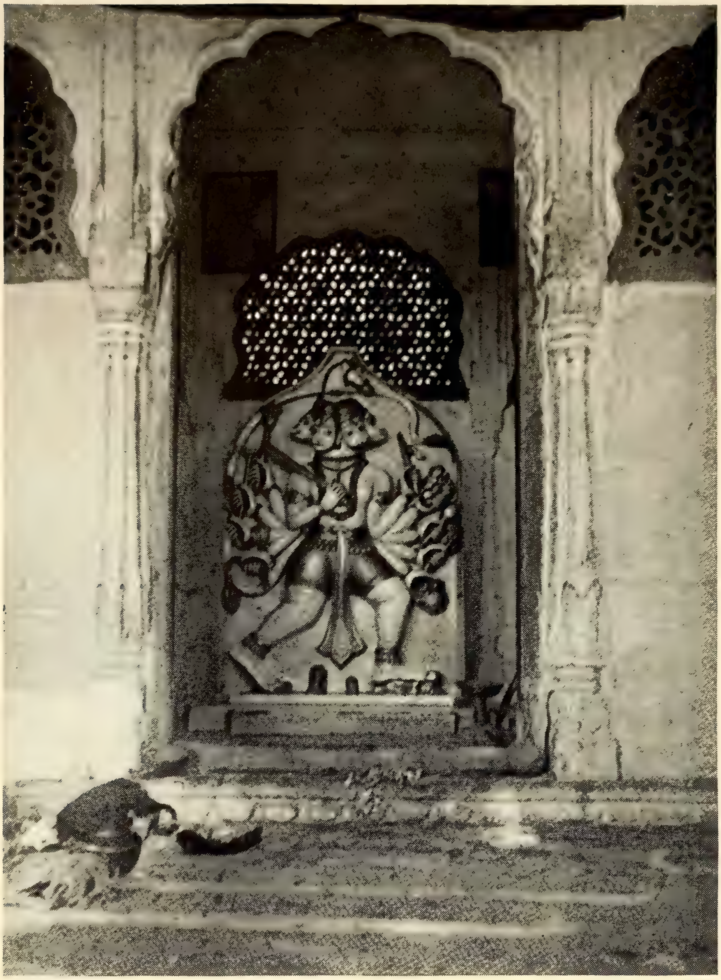
* Those familiar with history will recall that during the years 1661 to 1665 plagues and pestilence raged in many parts of the world, notably the Great Plague of London.



THE FOUR-HEADED AND MANY-ARMED GOD HANUMAN IN THE TEMPLE OF KANKROLI: RAJPUTANA

This weird guardian and protector of the marble dam at Lake Raj Samand is richly decorated with gold and in colors.

icles of Raj Singh reads: "That instead of rain a pestilential vapor blew from the west. The streams dried up, fishes became extinct. Cities were depopulated, the seed of families lost. Trees were stripped of their bark and eaten. Foul things unknown as food were devoured. . . . Then the hope of all was lost, for *man ate man.*"

Lake Raj Samand is not only a monument to the thousands who perished, but literally the water of life to the generations of the future.

The construction of these lake dams shows prevision and a knowledge of the difference between perpetual springs and others in this region which have been known to disappear suddenly, sucked into the vortex of underground rivers, such as the Sarasvati, that mysterious stream which loses itself for all time under the sands of the Rajputana Desert.

MARBLE RAISED BY INCLINED PLANES

These royal builders must have inherited, too, in no small degree, the constructive art of their Indo-Aryan forebears, to have combined scenic effects of surpassing beauty with practical benefit to the race. The engineering feats which converted these vast arid wastes into fertile rice and grazing fields inspire additional admiration when it is borne in mind that the work was done by hand labor, dynamite for blasting and derricks being unknown in that day.

When heavy blocks of marble were to be carried to great heights, inclined planes were used, as in the case of the "wagon"-shaped stones on the top of the Dravidian temples of southern India, which were raised to their present position by inclined planes four miles long, constructed of stout bamboo.

This part of Mewar seems an enchanted region, for in the cold season—that is, cold at night and in the early morning—a curious phenomenon occurs, which the people call *see kote,* or "winter castles." The lakes, the marble dams, mountain palaces, temples, fortresses, and the blue tent-like Aravallis appear high up in the cloudless ether. The visions differ somewhat from the ordinary mirage, in that they constantly fade and gently reappear, as though on a slow motion-picture screen.

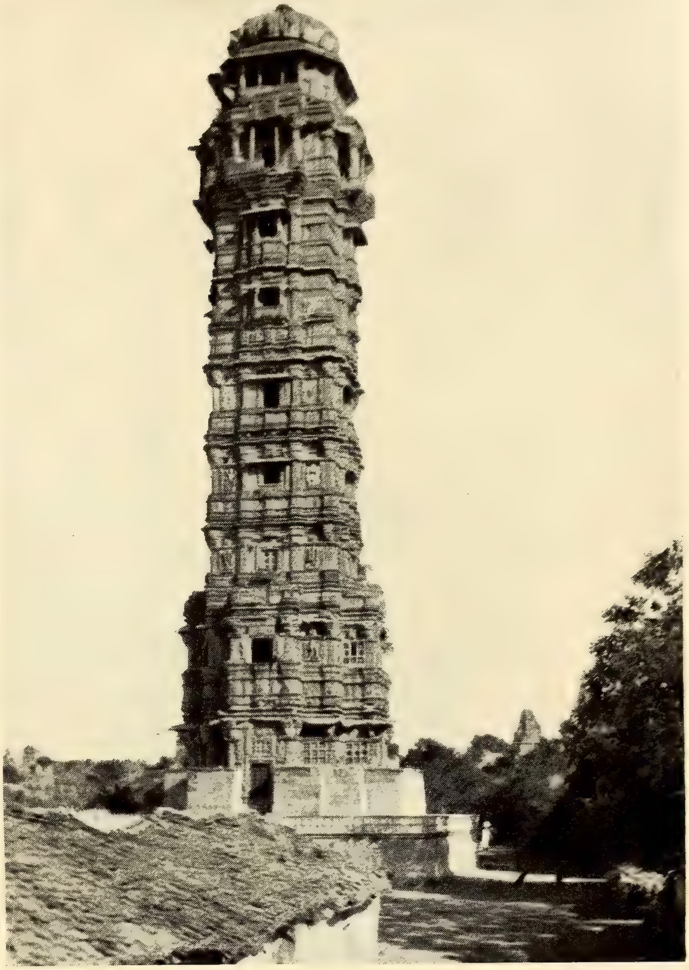
At all times there is something in the atmosphere here best described as elusive radiance, which makes panoramic photography disappointing. Objects at an appalling distance leap into the field of the camera, while those in the foreground seem to recede. Of course, the necessity of photographing at long range and from great heights anything so extensive as the marble dams and mountain fortresses would naturally distort the classic outlines of the one and greatly reduce the imposing effect of the other.

EKLINGI IS A SUMPTUOUS COLLECTION OF SHRINES

Temples in India are usually found near rivers or beside living springs, as water for bathing purposes is an important phase of both the Hindu and Mohammedan religions; so that the waterless and most inaccessible portion of Rajputana is the last place where one would expect to find anything so sumptuous and altogether unusual as Eklingi. In the words of a pertinent Hindu aphorism, it lies in a deep defile, "like a tongue between thirty-two teeth," surrounded by a massive wall, which keeps the parasitic *Candelabra euphorbia* bushes at bay. Low mountains rise on all sides, with rock-scarped summits covered with black honeycomb, the habitation of millions of bees, the vicious little black Indian variety that will rout an army.

Eklingi, like the dams of Mewar, is of white marble from the foundation stones up, immense and most elaborately embellished. It is difficult to convey a comprehensive idea of anything so complicated, for the temple as a whole represents the accumulated work of a long line of kings (see illustration, page 471).

Whenever one of the "Sun-born" won a battle, or through favor of the gods was blessed with an heir, he added a statue or shrine to Eklingi, regardless of labor or expense, the ambition of each being to make his more elaborate and costly than the others. Grouped round



THE PILLAR OF VICTORY AT CHITOR

This is one of the most remarkable monuments of its kind in India, with a height of 122 feet and each of its four faces measuring 35 feet at its base. Its carvings represent every object known to Hindu mythology, yet in such fine detail that it can only be appreciated through field-glasses. Erected in 1451, it stands today firm and undefaced on its rock foundation.

the original edifice, or fane, there are innumerable separate structures, varying in size and no two exactly alike, although all conforming to the prototype.

A full-sized bronze Siva bull rests in solitary state among the sculptured columns of the square central temple, the roof of which, from above, appears as if covered with thousands of Lilliputian shrines welded into a solid mass and carved in fine detail. No one has ever been able to explain why such pains were taken with decorations where, apparently, no human eye was ever intended to see them.

Rana Kumbha's life work for the protection of Mewar was the building of thirty-two fortresses, chief of which is Komulmair, or Kumbhalgarh, on the "Hill of Kumbha," 800 feet high, with a great "cloud-capped" palace on the top. Walls of enormous thickness, strengthened by towers and battlements, embrasures and inside galleries, wind and double upon themselves round and round to the summit (see illustration, page 470).

As is usual in these defenses used for the protection of royalty, the hill is pierced with secret chambers, while huge cisterns in the solid rock were used for storing water.

Tales of romance and of "battles long ago" center round Komulmair. The infant Udai Singh, later the founder of Udaipur, was carried to the fortress by his faithful nurse, after her escape through the underground passage at Chitor, when the child was about to be murdered by his uncle. This incident is the theme of a poem by Sir Edwin Arnold, "The Rajput Nurse."

HOW THE TRAVELER VISITS CHITOR

Chitor is easy of access, all that is necessary being to write to the private secretary of the Maharana at Udaipur, who makes arrangements for the accommodation of visitors at the dak-bungalow, or rest-house. The entertainment is somewhat primitive, but, being offered through the courtesy of His Highness, one accepts it gratefully.

Through trains from Bombay and Delhi meet at Chitor in the early morning. Approaching through the gray of the "false dawn" peculiar to India, the gigantic walled rock, crowned with a dead city, looms afar as though frowning with unhappy memories on the surrounding plain.

Ganshi—venerable, hard-headed, with thirty years of accumulated elephantine malice toward all who want to be taken up the long, steep climb to Chitor—will be waiting, with her mahout beside the morning cooking fire, under the sweet-flowering Chameli trees, back of the white plastered, blue convolvulus-covered station, with its rows of trickling water hydrants.

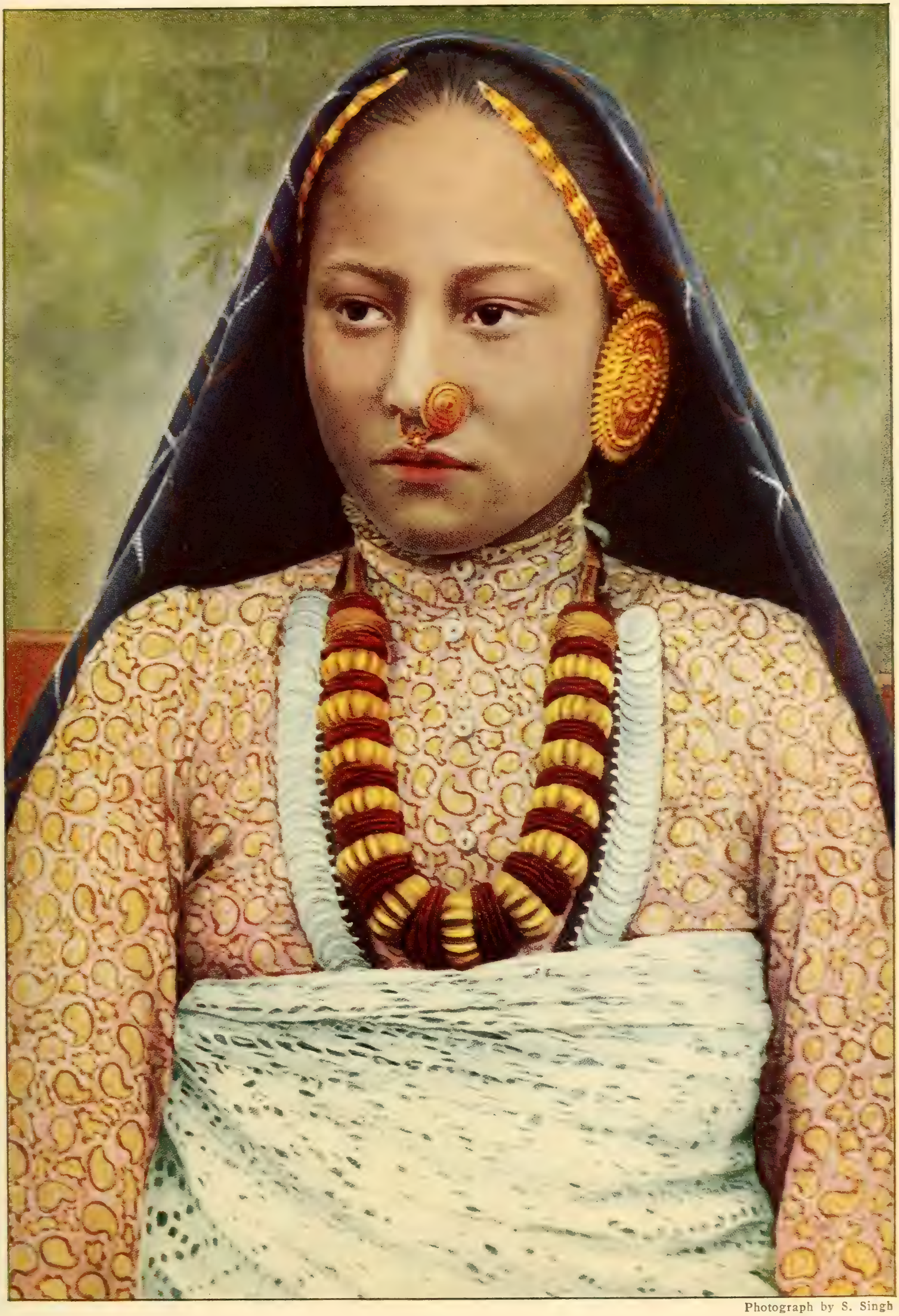
THE THRONE OF A HUNDRED WARRIOR KINGS

Chitor was once an impregnable fortress, the throne of a hundred warrior kings, the repository of vast treasure and priceless works of art. Along the zigzag ascent, bronze gates closed the seven great archways, which were high enough to admit the tallest elephant topped by a howdah.

Above all towers the majestic Pillar of Victory, begun in 1451 and finished some years later. Too great even for the despoiler, it stands as firm on its rock foundation as when Rana Kumbha placed it as a "ringlet on the brow of Chitor." No words can paint a picture of its carven imagery that entwines, from base to summit, every object known to Hindu mythology. The column stands 122 feet high, with each of its faces 35 feet broad at the base and more than 17 feet broad under the cupola. It has nine stories, with landings on a spiral staircase at openings in the face of each story. In the vaulted chamber at the top are black marble slabs inscribed with the genealogy of all the kings of Chitor.

The carved exterior can only be appreciated with field-glasses, and even then none save the gray hawk-moths and pigeons ever see those at the very top. In photographing the whole with an ordinary camera, most of the fine detail is lost.

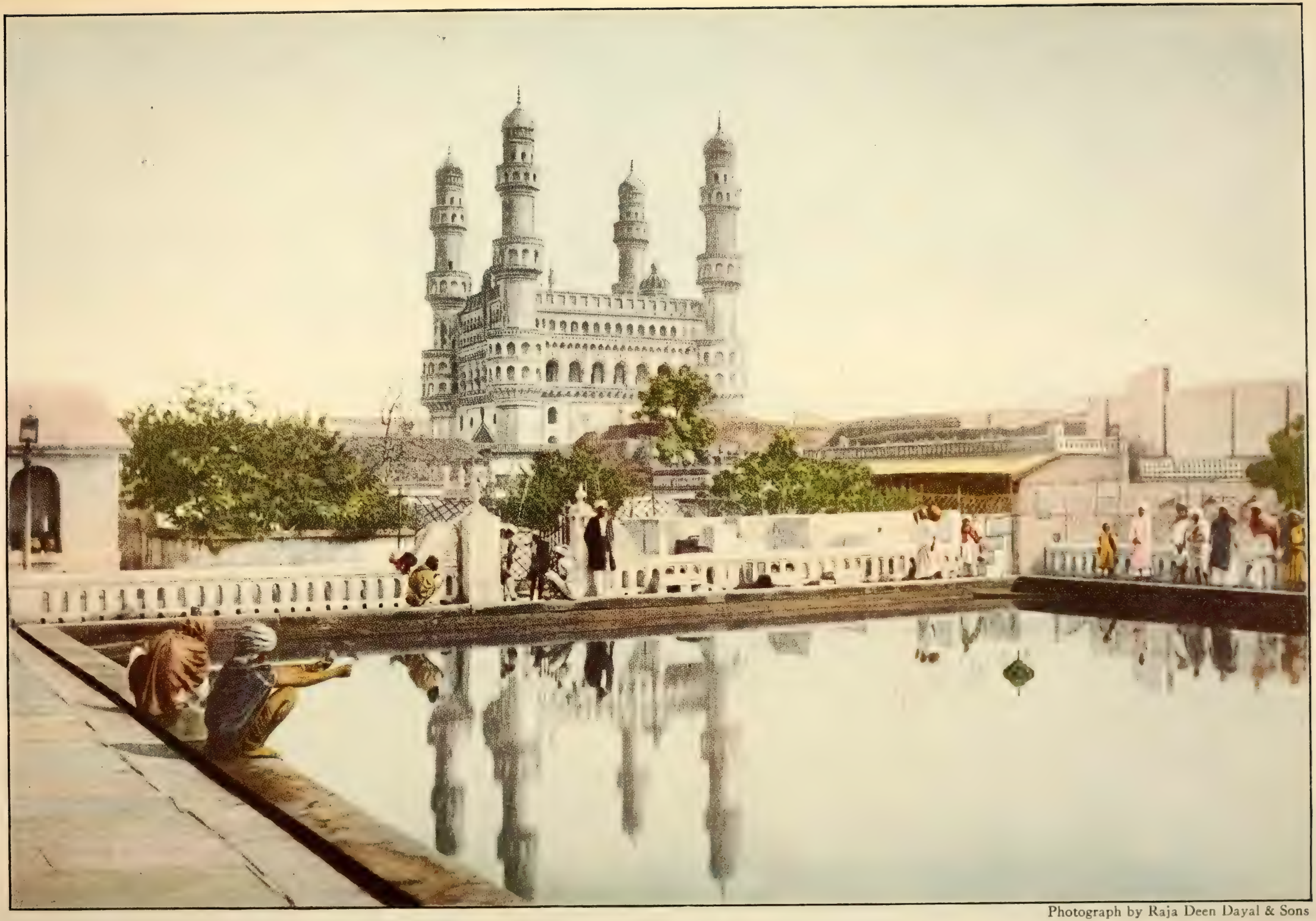
Here may be seen the classic Hindu architecture in its original purity, the sculptured subjects being reposeful and rhythmic, with none of the sinister expression and grotesque posturing of mixed Dravidian-Hindu art. The exterior walls and fluted domes of half-ruined temples and other buildings are



Photograph by S. Singh

A WOMAN OF NEPAL AT THE DARJEELING BAZAAR

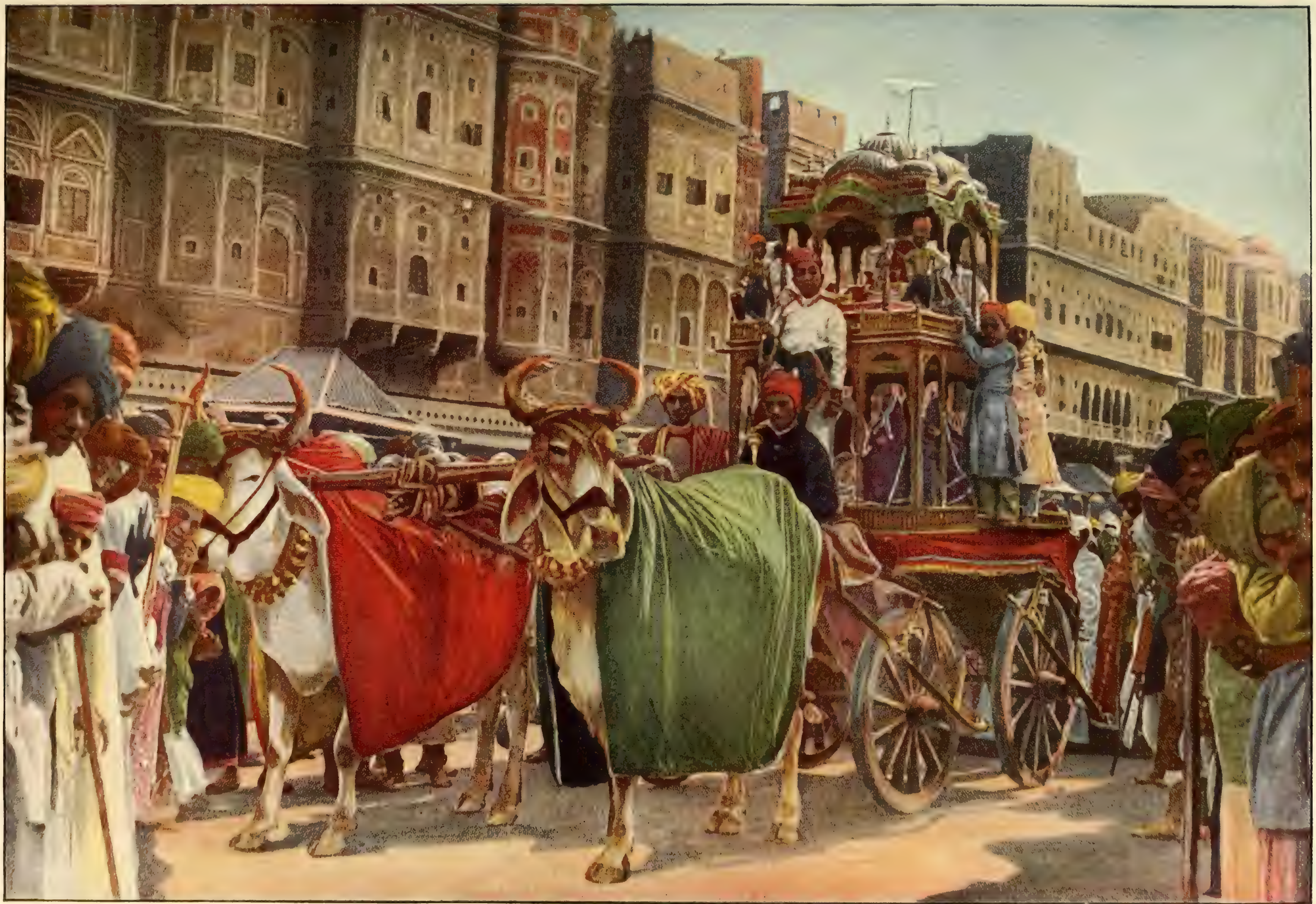
Who does not long to see Darjeeling, guarded by Kinchinjunga's snowy wall reared heavenward, and to enjoy in the market place a colorful display of gaily-clad Himalayan women, with heavy coin chains hung about their necks and nose rings glittering in the ardent sun?



Photograph by Raja Deen Dayal & Sons

THE MIRRORED MINARETS OF HYDERABAD

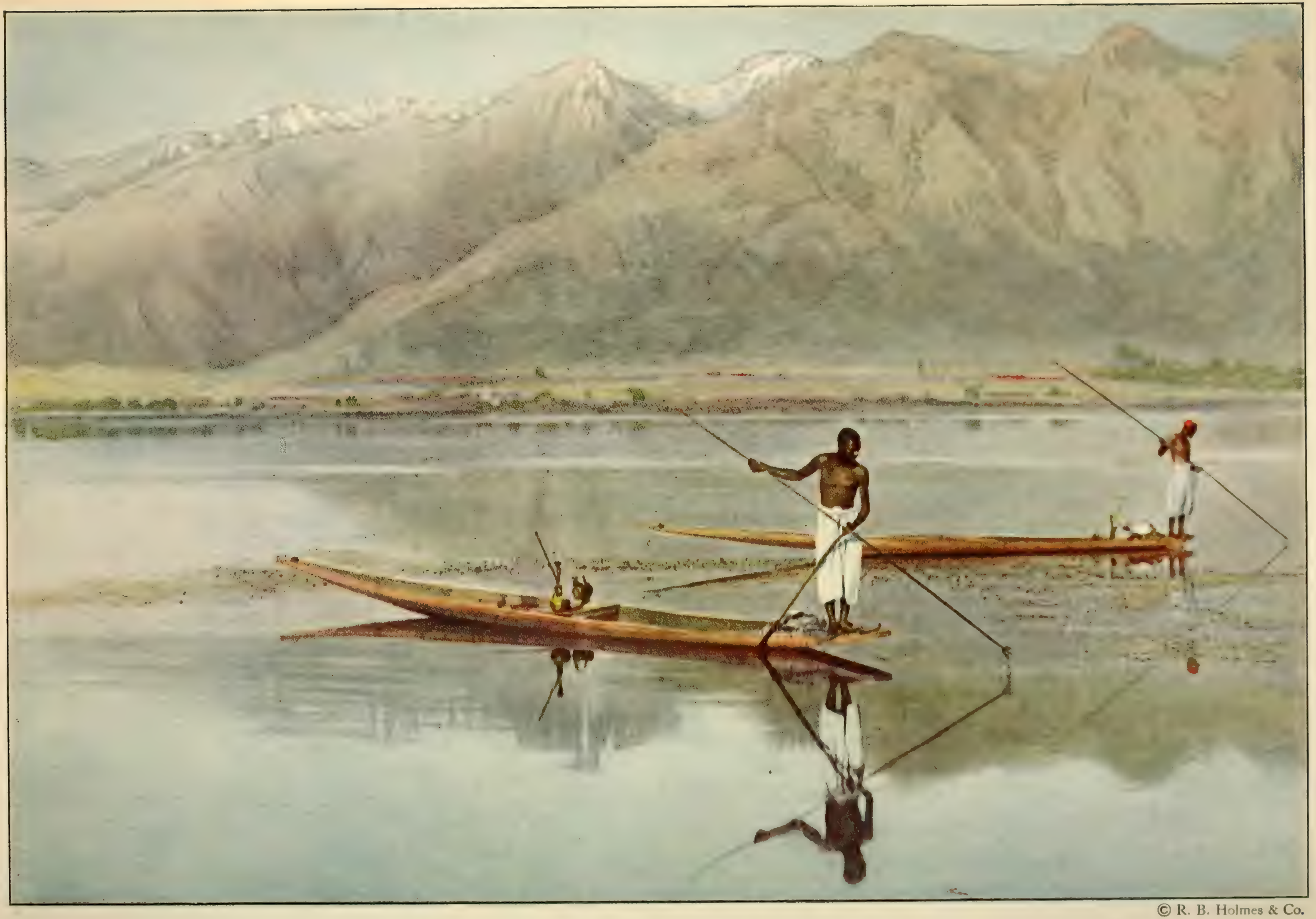
Before the Moslem prays, he stops beside some placid pool which serves as his baptismal font and there prepares to testify to the greatness of his God. The mosque tanks of Islam mirror the beauty of sun-bathed scenes which men of their creed are forbidden to paint.



Photograph by William W. Chapin

WHEN ONE OF JAIPUR'S TINSELED GODS GOES VISITING

Paved streets, city water and gas lights cannot destroy the old-world charm of picturesque Jaipur, where the Maharajah has a thousand wives and a tank of crocodiles, and where the Hindu god is drawn through the city by bullocks blanketed in priceless coverings, while bright eyes, hid behind high lattices, look down in envy on a world of men.



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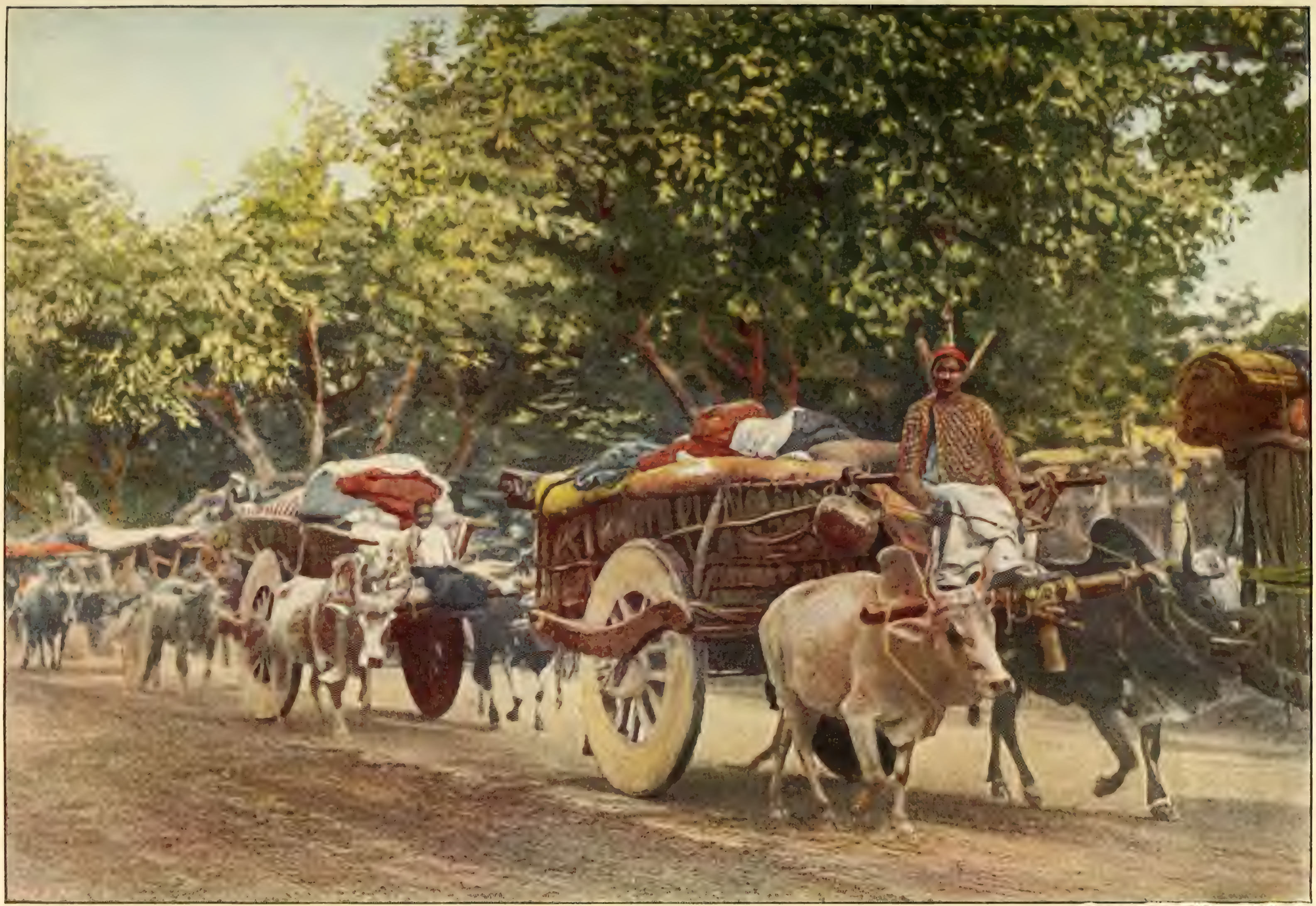
THE LOVELY LAKE OF KASHMIR'S HAPPY VALE

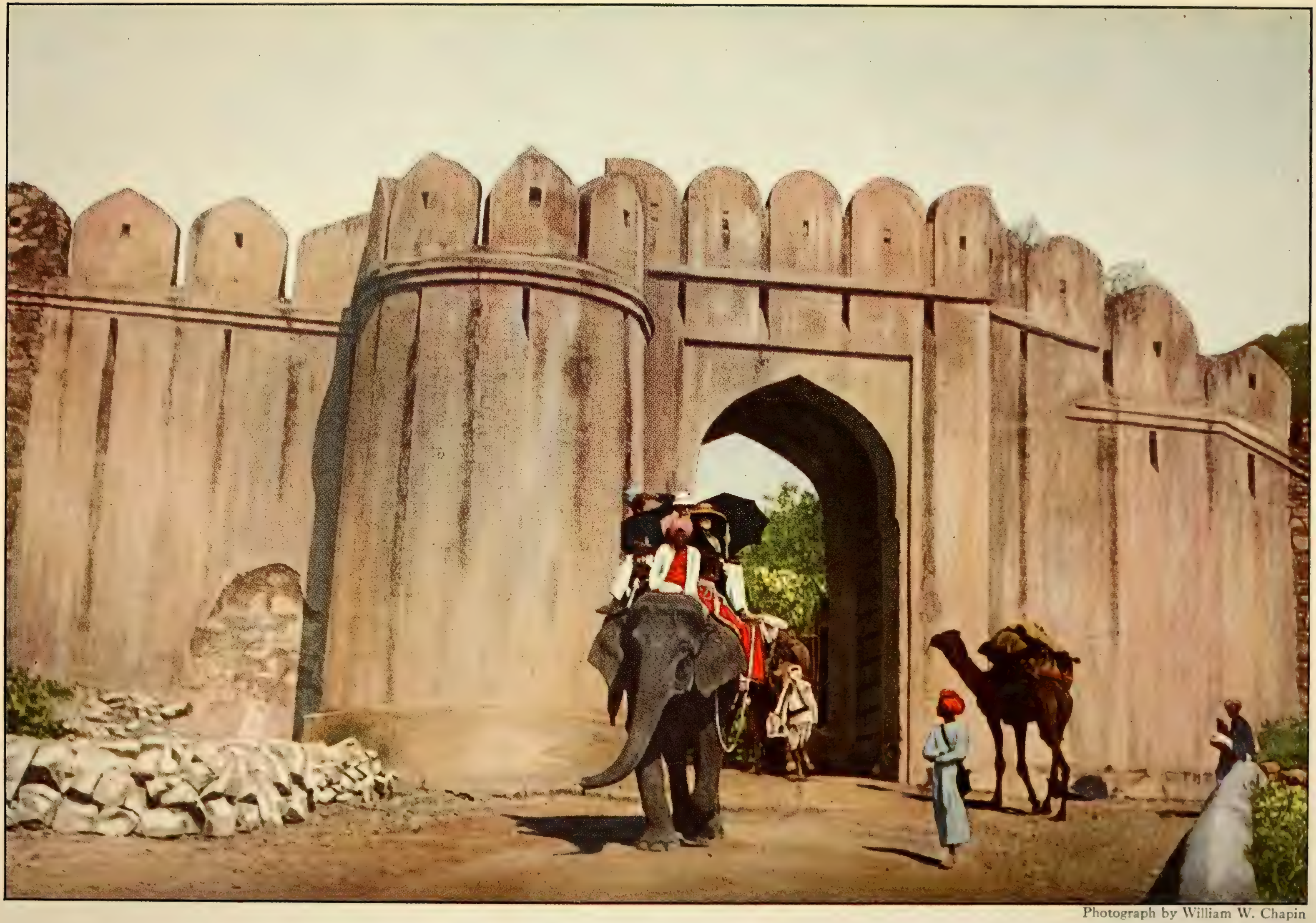
Dal Lake, near Srinagar, has been the inspiration for many a poet and singer. Snow mountains are reflected in its waters and many types of craft float here and there on business or on pleasure bent.



Photograph by William W. Chapin

A BULLOCK TRAIN IN LUCKNOW

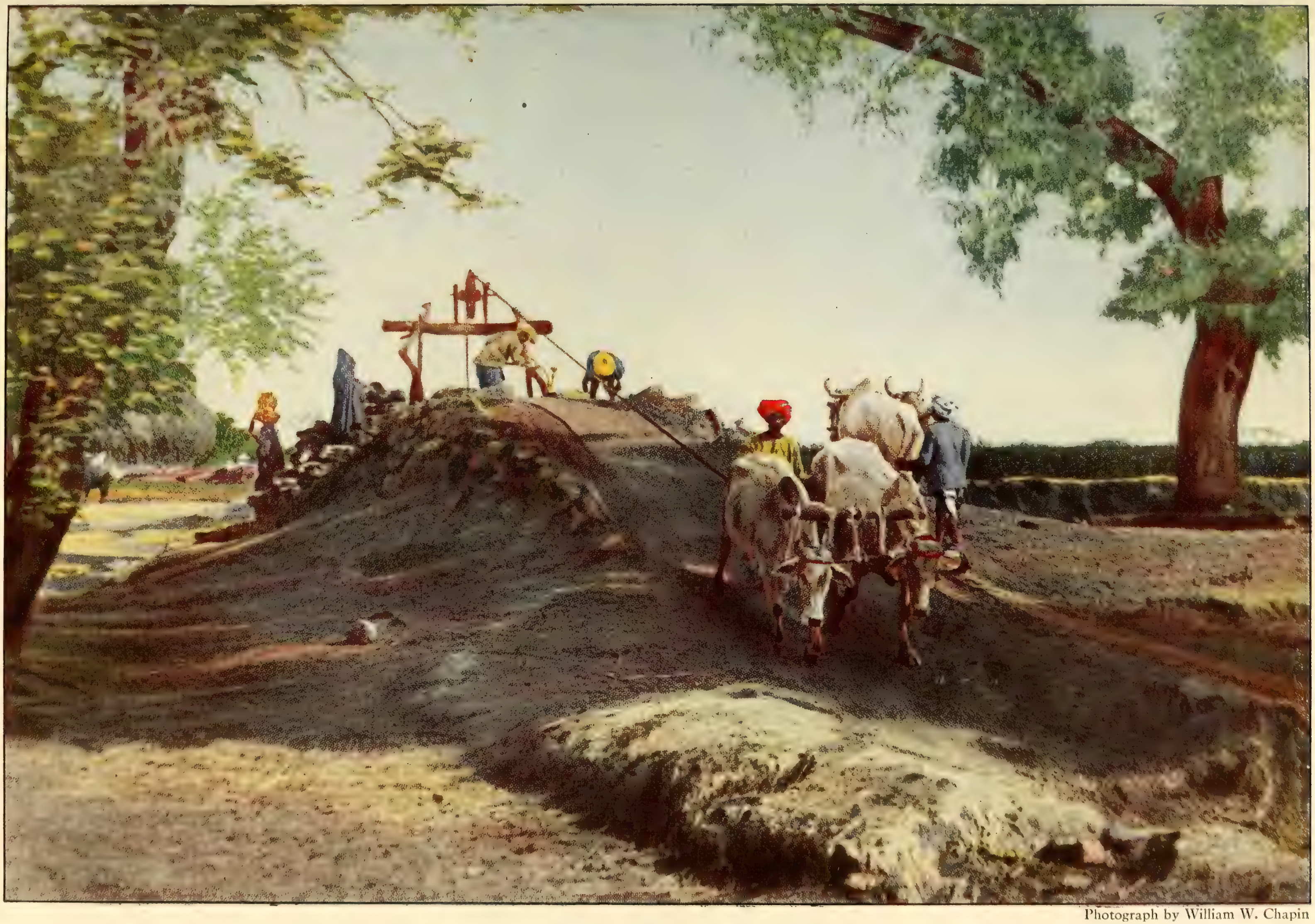
Where Scottish pipes, playing "The Campbells Are Coming," ushered in the Relief of Lucknow, creaking wagons with wooden wheels and crude axles now chant the song of the open road, of peaceful trade and plenty.



Photograph by William W. Chapin

WHERE CITIZENS ENJOYED THE RIGHTS OF ROYALTY

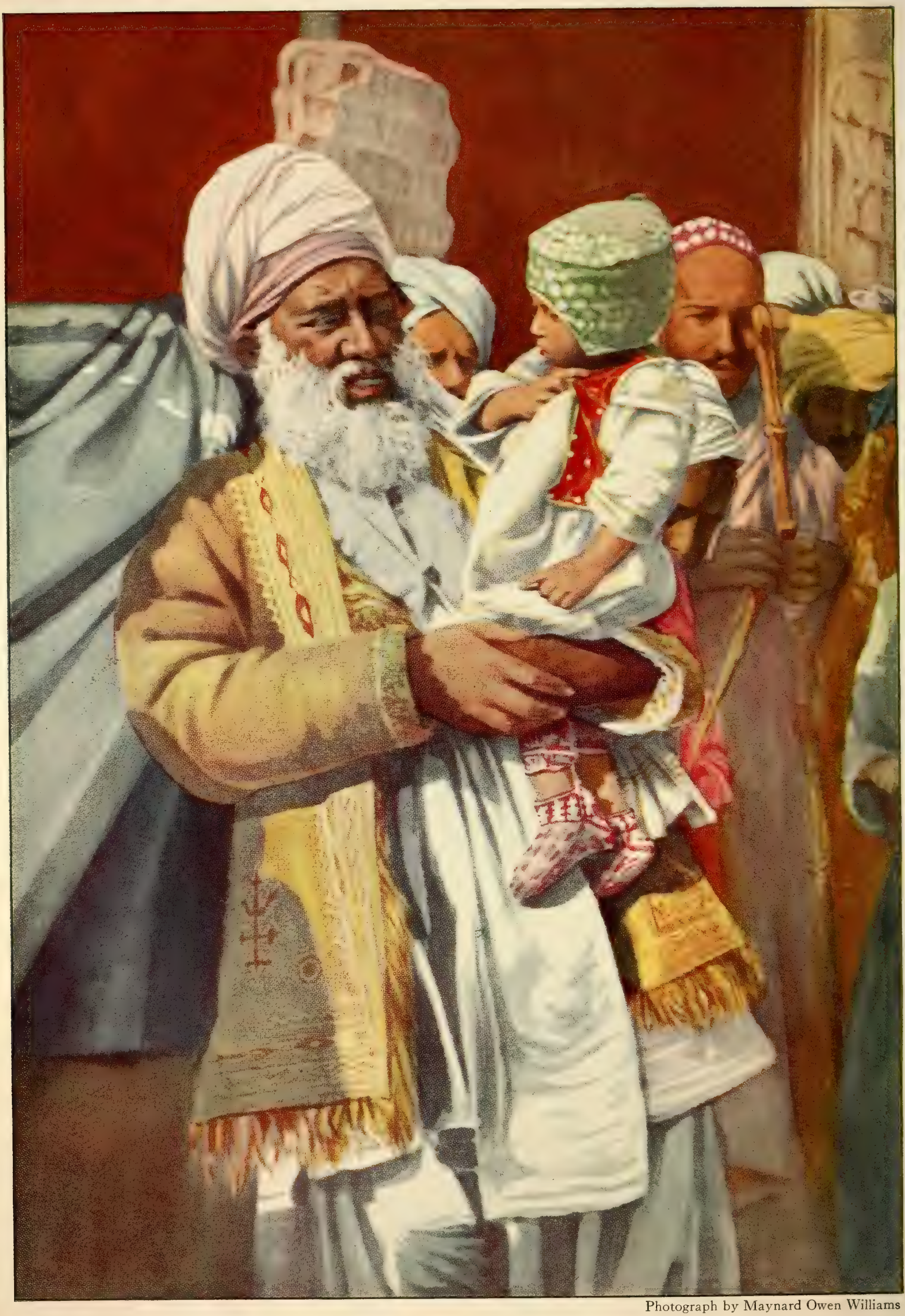
Until recently, when an excellent carriage road was completed to the ancient capital of Jaipur State, the Maharajah furnished elephants from his private stables to his guests for the ride to Amber, one of whose outer gates is here shown.



Photograph by William W. Chapin

AN INDIAN WELL NEAR DELHI

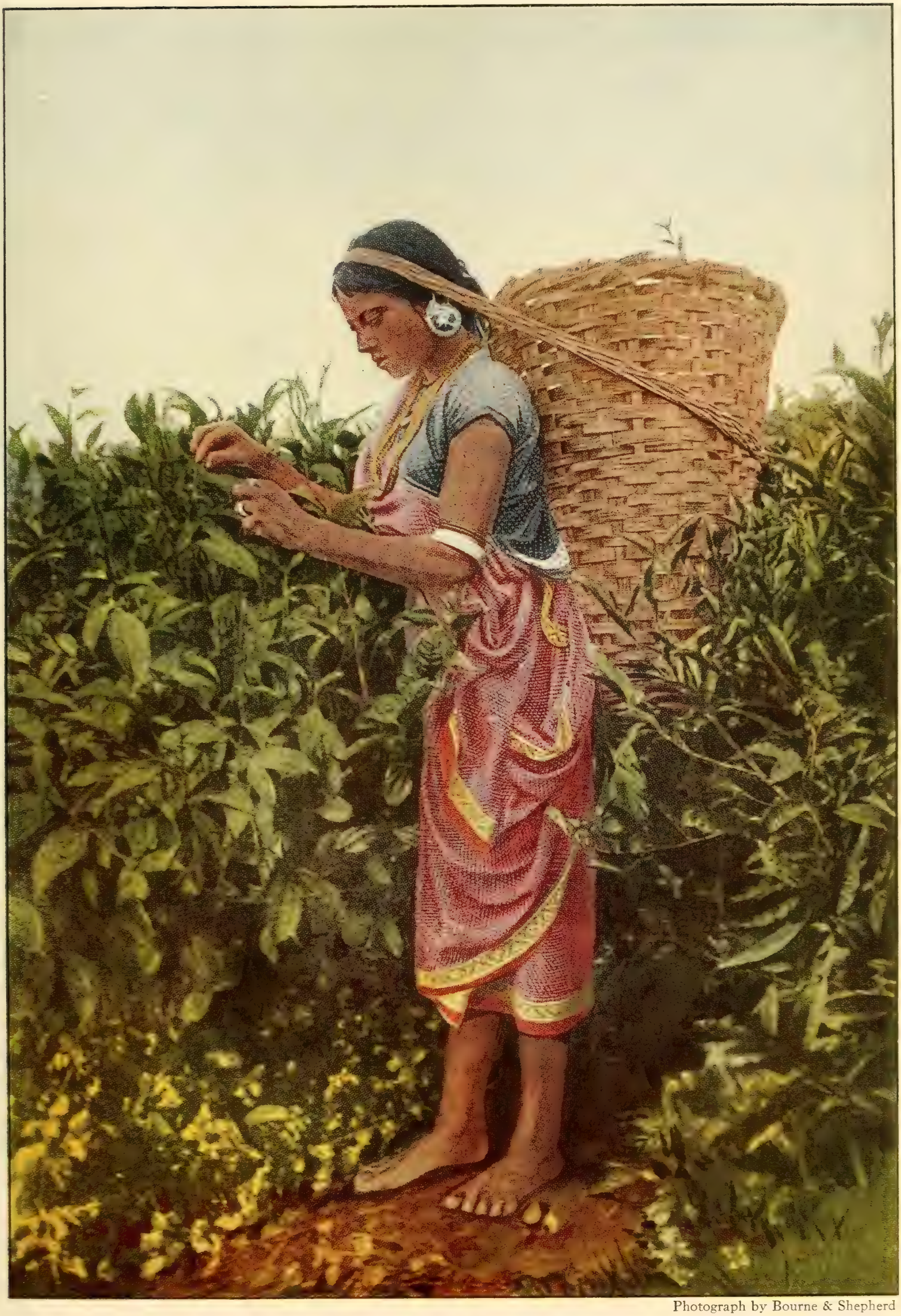
Water is won from the reluctant soil of a thirsty land only with infinite toil. The *mot* of India, like the *shadoof* and *sakkieh* of Egypt and the Persian water wheel, is a contrivance born of sun-parched earth and cheap labor. A leather bag is the Old Oaken Bucket of India, against whose weight slow-footed bullocks pull. It will hold from twenty to forty gallons of water, part of which is carried away in shining vessels on the heads of graceful women.



Photograph by Maynard Owen Williams

HUMAN INTEREST ON THE NORTHWEST FRONTIER

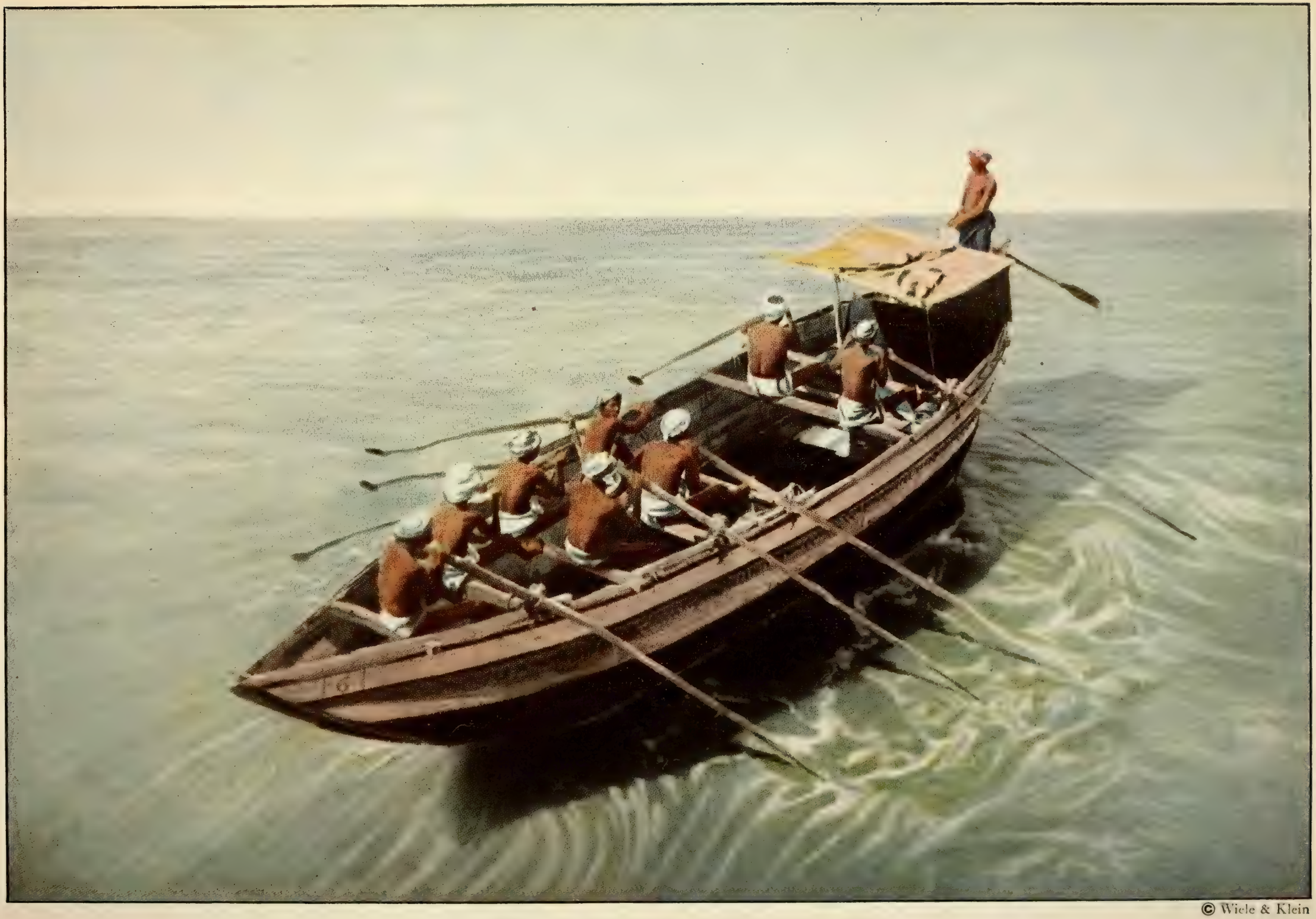
To some, the romance of India's Afghan boundary consists in breakneck rides while snipers shoot from rocky ambush near the Khyber Pass. Others read romance in the stately tread of Bactrian camels, bringing down the treasures of Merv to exchange for the wealth of the Indies. But this old man of Peshawar, clad in his yellow *postin*, sees romance in the trustful eyes of his gaily dressed grandson.



Photograph by Bourne & Shepherd

A TAMIL WOMAN PLUCKING TEA LEAVES

Once the drink of the nobles, tea has now become so cheap that all can afford the cup that cheers. For the first time in history, production has exceeded the demand and many estates are being neglected until the world's thirst for tea gains new impetus.



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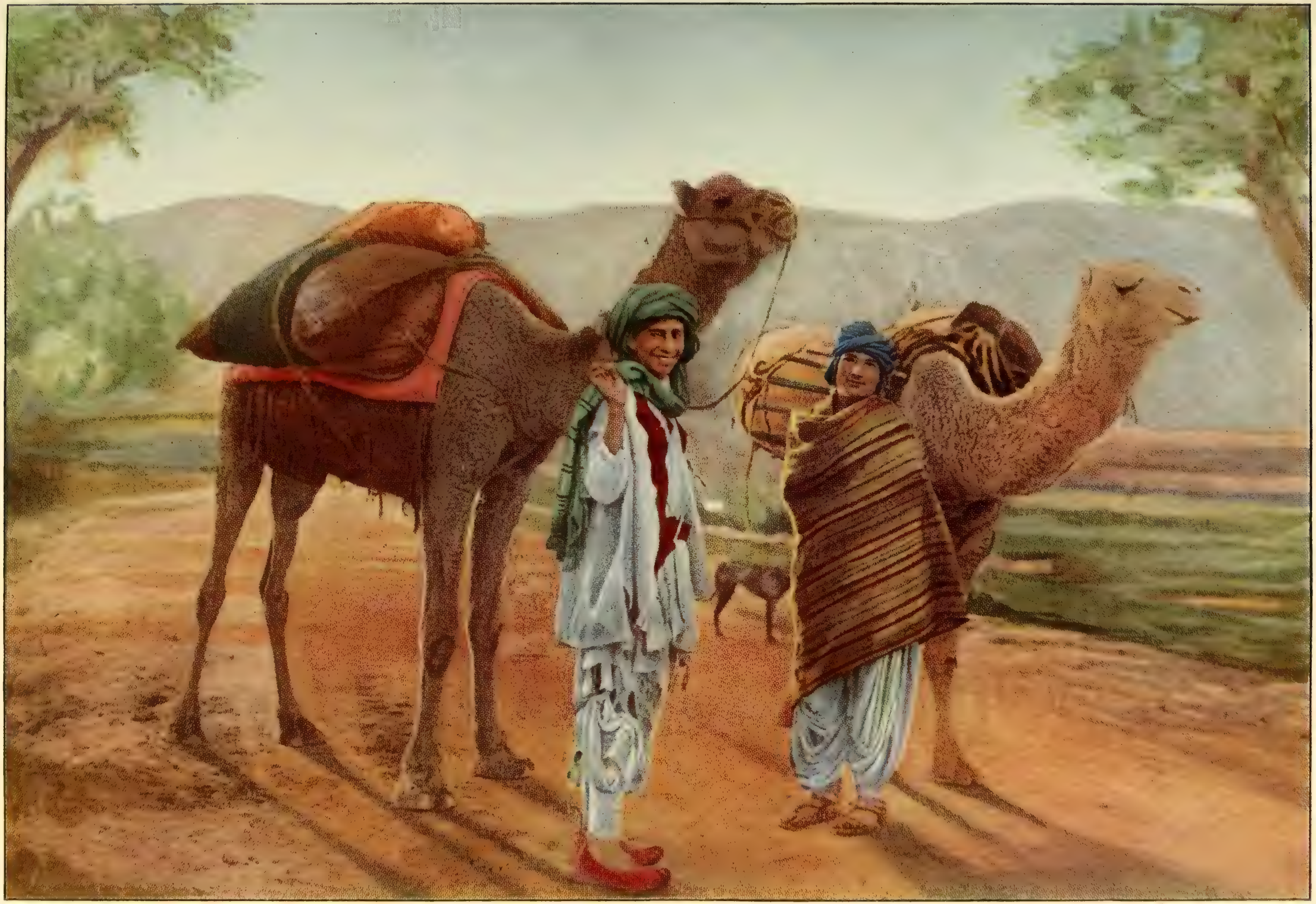
A MASULA BOAT GOING OUT TO THE SHIPS

India sadly lacks good harbors, as did Palestine of old. At Madras, the freight and passengers were formerly brought ashore in Masula boats more crude than those the Jaffa boatmen use. The city has greatly improved its harbor facilities, but these heavy hulks are still pushed out through the high surf by men of bronze and propelled by rude oars with circular blades.



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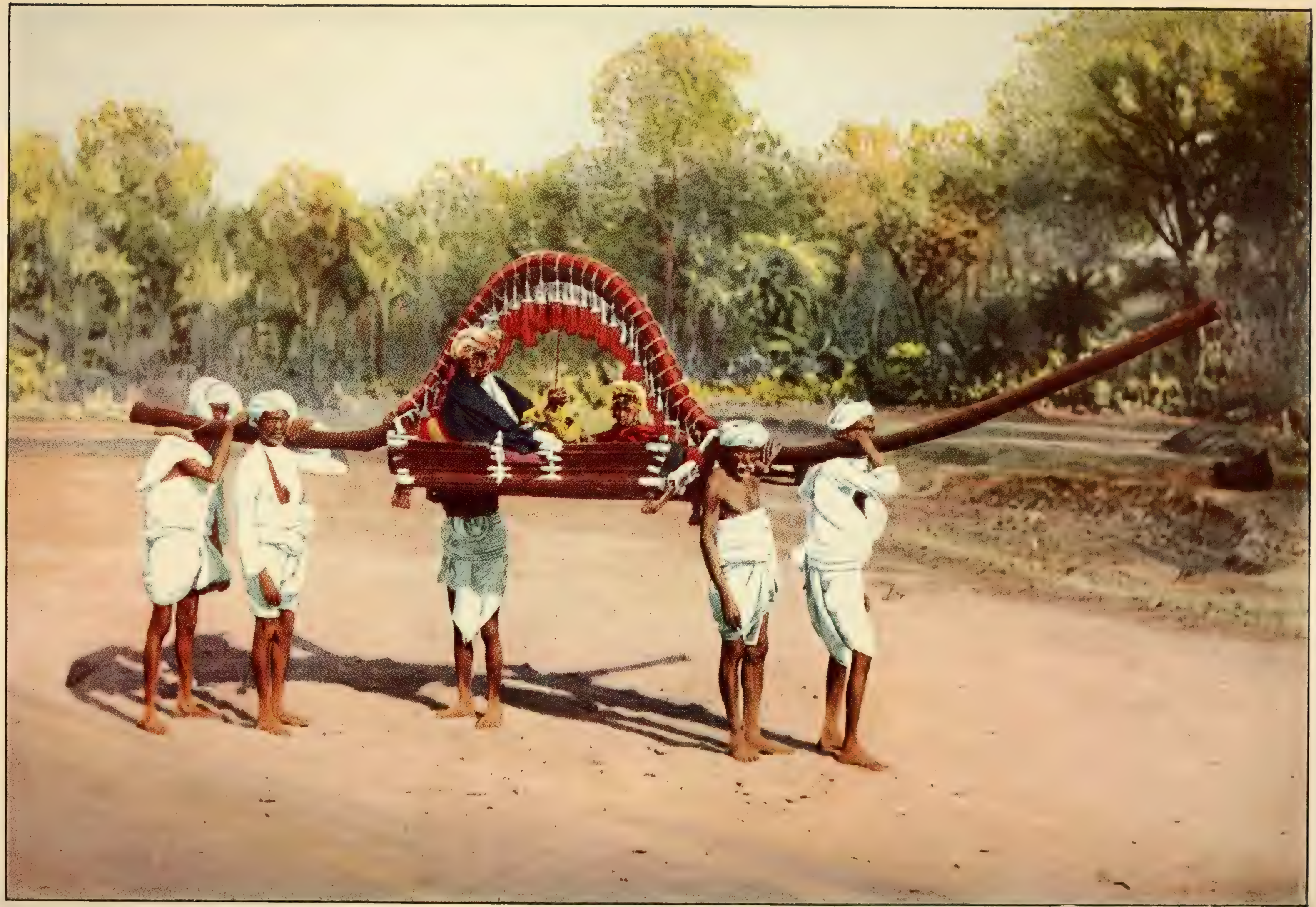
AFGHAN CAMEL BOYS AND THEIR COMMERCE CARRIERS OF CENTRAL ASIA

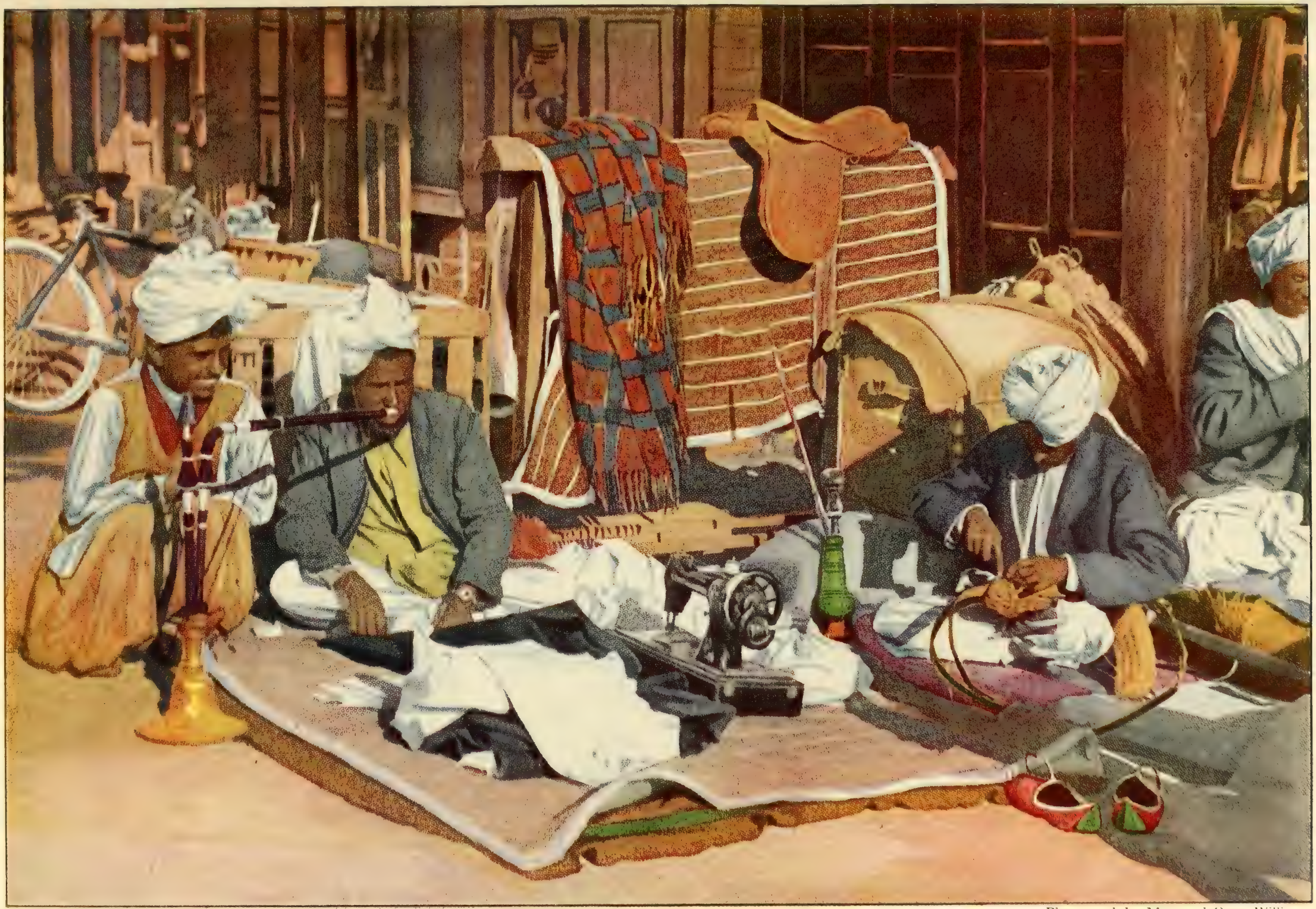
Less picturesque but more hardy than their Bactrian cousins, Arabian camels can stand heat as well as a considerable degree of cold. The dromedary, as one of the earliest of man's servants has gained a dignity which the more clever donkey has not attained, in spite of the fact that a donkey leads most caravans.



Photograph by Raja Deen Dayal & Sons

INDIA'S HONEYMOON CAR

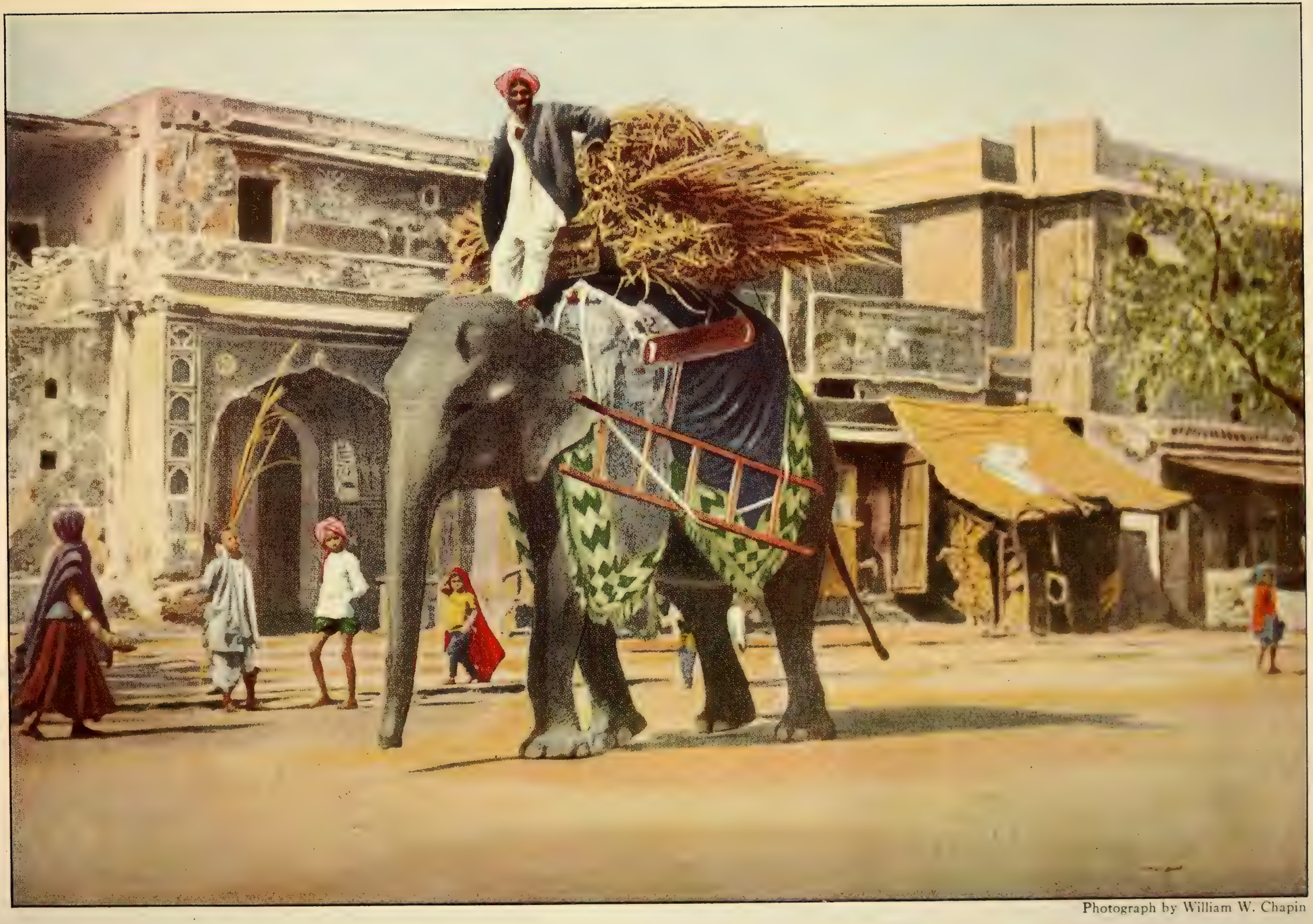
Nowhere does one find more varied forms of transportation than in India. Whether it be in the curtained howdah strapped to the broad back of a gaily caparisoned elephant or in a rickety jinrikisha drawn by a hookworm subject, no one walks who can ride. This unusual palanquin is a palkee, in which a middle-aged husband is conveying his youthful bride to her new home.



Photograph by Maynard Owen Williams

A QUETTA TAILOR WHO ALSO COBBLES

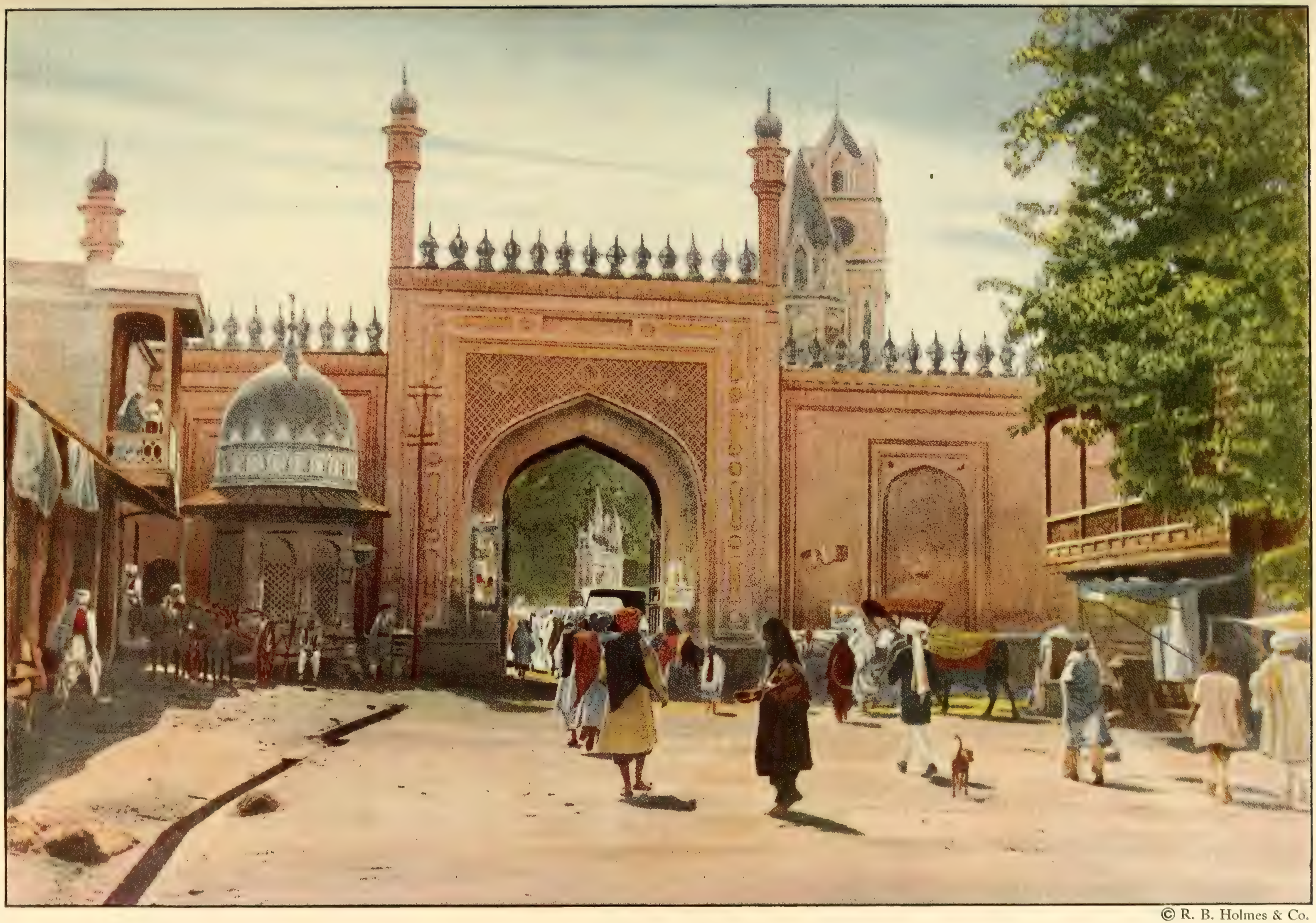
Specialization and division of labor are not common in Baluchistan. A tailor can drive his needle through leather instead of cloth without violating his journeyman's charter. His hookah furnishes consolation for lack of such organization as would force him to look up his prospective task in a blue book before undertaking it or passing it on to another.



Photograph by William W. Chapin

IT'S NO CIRCUS TO BE AN ELEPHANT IN JAIPUR

Why a pachyderm so splendidly draped should be forced to carry straw and why a step-ladder has supplanted the trunk as an elevator to the hurricane deck of the beast is inexplicable, except on the assumption that the "Unchanging East" is changing.



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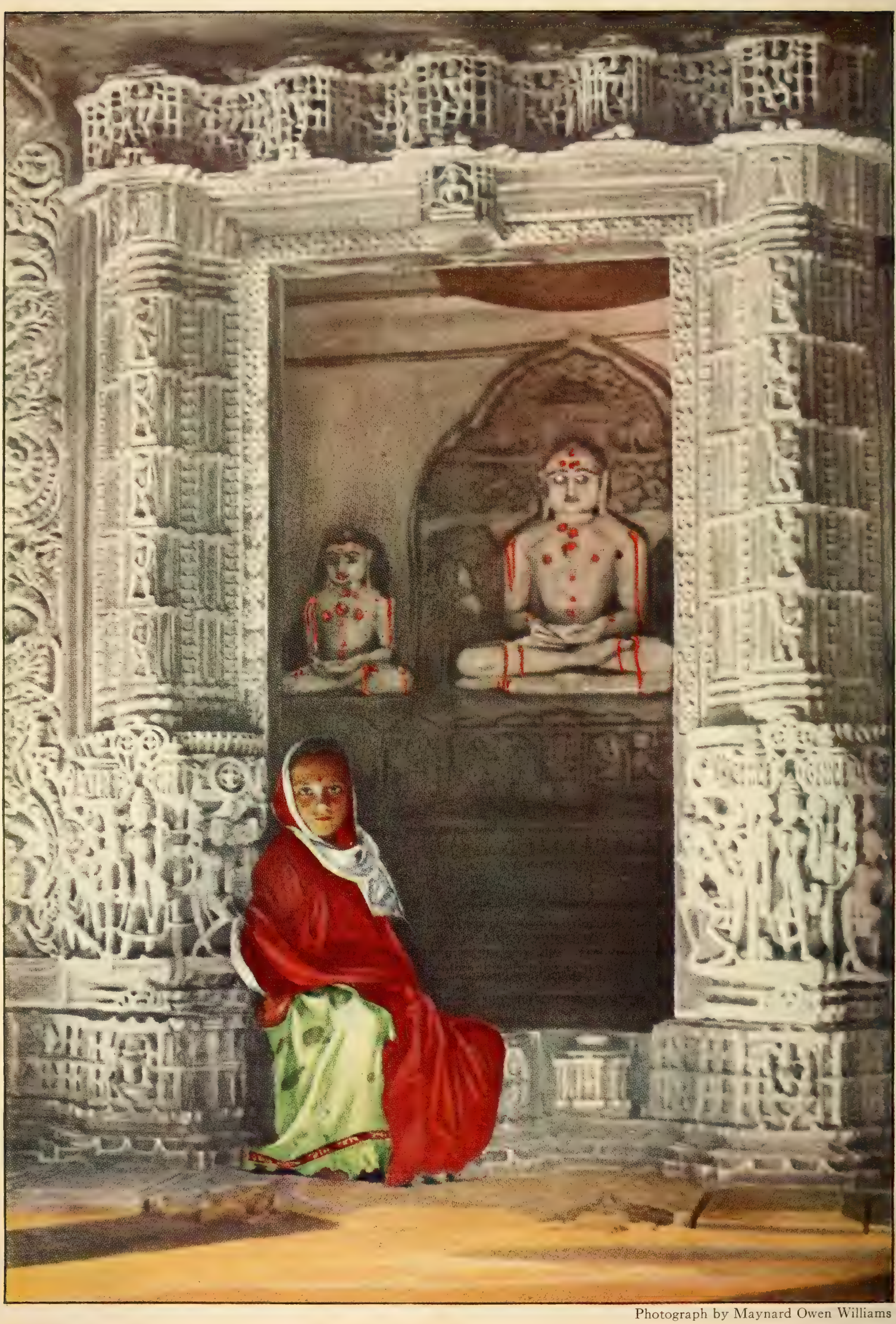
ONE OF PESHAWAR'S SIXTEEN CITY GATES

Like Bokhara, which it somewhat resembles, Peshawar is lacking in architectural beauty. The houses, built of mud, or sun-baked bricks, are unpretentious. But sections of the wall are imposing, and the street life at India's main northern gate is always lively and colorful.



Photograph by Maynard Owen Williams

PETRIFIED LACE ON THE JAIN HILL OF WISDOM

Mount Abu is the charming mountain retreat of barren Rajputana. Its brightest jewel is the Nakhi Lake, excavated in the sandstone plateau by the finger-nails of the Gods. There are two temples where the architect has transformed marble into diaphanous drapery and jewel chains. This is one of the Tirthankar cells, erected to the deified saints of the Jains in the temple of Vimala Sah.

deeply carved, the figures standing out free from the surface, held by a slender thread of stone or marble, the perfected art of Aryan chisel.

This is noticeable in what remains of the Temple to Brahma, which in its day must have been one of the most beautiful specimens to be found in India. Although now a ruin, strangely enough it was not defaced by the Mohammedans, whose fanaticism took the form of knocking off noses and ears from the Hindu gods. But, as the Brahma temple was dedicated to the Creator of all, it contained no "idols," either inside or out; so they passed it by (see page 477).

There is hardly an inch of plain surface on this temple. The figures are principally coryphees executing the "Dance of Joy." At the base is a procession of ceremonial elephants, each with its trunk curled around the tail of the one preceding. Another row portrays the heads of cats, or perhaps tigers. Intricately wrought medallions project like great cameos; small receptacles, or niches, pierced several inches into the marble, contain precious objects carved something after the fashion of Chinese puzzles, from the inside out—an ideal spot for nesting birds.

The Tower of Fame is more ornate than in good taste, with the exception of the first section, which redeems the whole by what are called true Hindu arches on each of its four faces. For the rest, here also there is not an inch of plain surface visible. It gives the impression that, having exhausted reproductions of every known object on the Pillar of Victory, the artists wound the Tower of Fame with sculptured bands resembling lace.

MANY OF THE PALACES REMARKABLY PRESERVED

It is not usual to find royal dwellings among ruins of the fourteenth and fifteenth centuries with much, if any, of their original architecture left; yet many of the palaces at Chitor present an imposing and almost inhabited appearance, until they are explored. At first, one might expect to hear women's voices, or see the flutter of a gay silken sari or gleam of golden ornaments from the upper balcony of an unmistakable old royal *zenana,* with sheer, unscalable walls.

Many conditions have contributed to the preservation of these buildings since man first laid them waste. In the first place, they were built of the hard Rajputana marble, limestone, and quartz, on a solid rock foundation that stands several hundred feet above the plain, in a hot, dry climate. Then, the life ambition of the Maharana of Udaipur is to restore the fallen capital of his ancestors on the old ground plan. For twenty years he has been engaged in repairing broken walls, in strengthening foundations, and in the herculean task of rebuilding the great city wall.

CHITOR'S AMAZING STORY OF HEROISM AND TRAGEDY

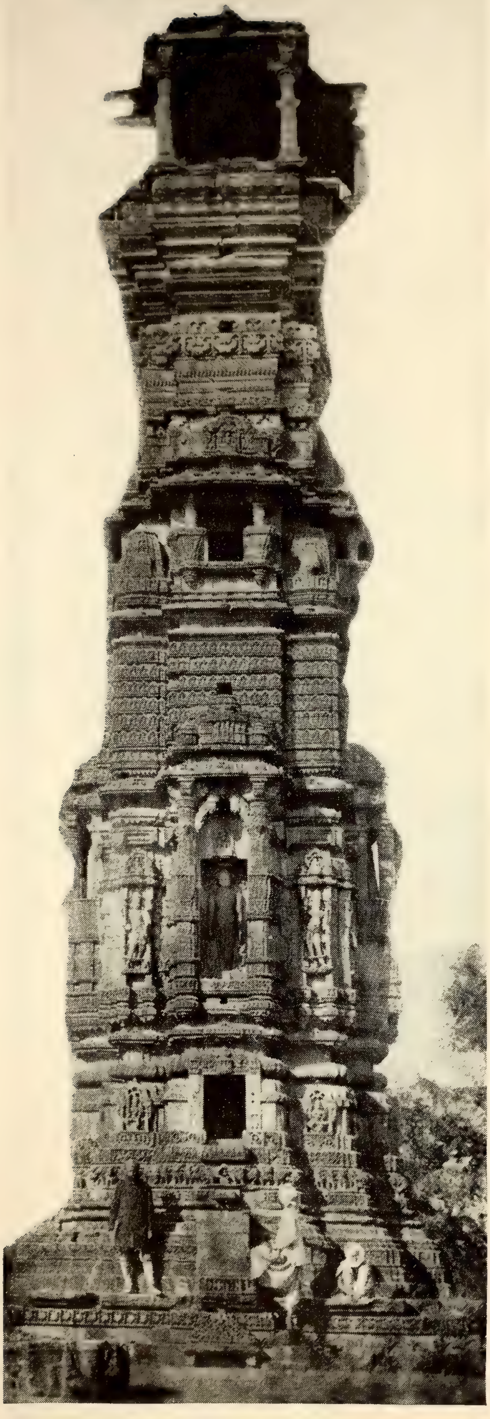
Following a rugged path through a tangle of custard-apple trees to a lonely spot in a deep cleft of rock, any one who has read Kipling's "Naulakha" would recognize the "Gau-Mukh," or "Cow's Mouth," where the "water trickles with a soft chuckle" from a grotesquely carved cow's mouth into a stone tank wrenched asunder by the "snaky roots of old mimosa trees." Here, too, is the entrance and also the exit to a series of subterranean galleries with secrets of their own.

Chitor has an amazing history of fine romance, heroism, and almost unthinkable tragedy, so strange that the few Indian writers who have said much about it have entrenched themselves behind chronological data. Yet these happenings are as much a part of Chitor as the stones themselves.

The royal fortress city, almost from its foundation, was an object of greed and lust. It was three times sacked by the Mogul kings of Delhi, whose armies swarmed into the states of Rajputana like ants to honey-pots. More than all else, they coveted the modest "lotus-eyed" Hindu women.

Princess Padmini, the "Hindu Helen," was the wife of Prince Bhemsi, uncle and regent of the minor heir to the throne. The third and last sack of Chitor occurred when tales of her wondrous beauty reached Ala-u-din Khilji, then King of Delhi, who promptly set out with the sole object of capturing her.

After long and fierce resistance on the part of the Rajputs, Ala-u-din offered to remove his armies if he might be per-



THE TOWER OF FAME AT CHITOR

This is a solid mass of sculpture without an inch of plain surface. The cupola, which was struck by lightning, and the base have recently been restored by the Maharana of Udaipur.

mitted to look at the Princess' reflection in a mirror. His request was granted, but he somehow enticed Prince Bhemsi into ambush, as hostage for the Princess.

Torn between honor and safety for the prince, the Rajputs tried strategy, devised, it is said, by woman's wits. Word was sent to Ala-u-din that Padmini would be sent to him, but, as befitted her rank, with all her maids and serving-women. She, in her splendid dooli, followed by 700 attendants, each supported on the shoulders of four men, filed slowly through the seven city gates down to the Moslem camp.

When Ala-u-din, exultant and arrayed as a bridegroom, advanced to part the curtains of the dooli containing his prize, a shout went up, armed warriors tore off enveloping women's veils and fell upon the Moslems. In the confusion of the sudden attack the royal pair made their escape.

THE WOMEN OF CHITOR CHOOSE DEATH

Smarting with desire for revenge, Ala-u-din swore by Allah to enslave every woman in Chitor and lay the heads of the proud Rajputs in the dust. He increased his armies until they covered the whole plain, the men working day and night to raise a mound of earth to overtop the city walls at the one weak spot opposite the eastern gate, where the ground rose slightly—a conspicuous object to this day. They were paid first a copper coin, then silver, and last a gold piece for every basketful of earth.

At last, when the city was doomed and Ala-u-din with his guard was battering down the inner gate, thousands of women, princesses, and serving-maids, all who were young and fair in Chitor on that fatal day, veiled and wearing their jewels, mounted in swift procession the broad steps of the king's palace, then descended to the vaulted chambers in the rock foundations, where a low, iron-clamped door swung open.

One by one all passed through; some carried lighted torches, others bundles of fagots. Last of all came Princess Padmini, carrying the precious two-edged sword of the Sun Born Kings.

Flames leaped up, wreaths of smoke curled outward; . . . then the door was shut and barred.

The chaste Rajputnees were trained from childhood to choose death rather than fall into the hands of conquerors; so that wholesale self-destruction and immolation of women was by no means uncommon during the period of the Mohammedan invasion.

For nearly a hundred years the spot where the awful holocaust took place was shunned. To the Hindus it was sacred, and after the iron door rusted and fell away, the Mohammedans who ventured near declared they were menaced by a demon woman with a two-edged sword.

Tod, when he was the British official at Udaipur, spoke of having once stood before the open entrance to the rock-hewn vaults under the king's palace. He confessed that "mephitic vapors and venomous reptiles did not invite inspection, even if official situation had permitted such slights to prejudice."

The opening has long since been sealed, and is never shown to strangers unless they ask to see it. Golden sunlight now streams over the crumbling steps, and hundreds of peacocks strut about, complaining mournfully and roosting at night in the empty palace casements.

A pair of bronze gates, two alabaster elephants, and the great kettle-drums that used to lead the Chitor kings to battle, were carried off by Emperor Akbar and may be seen in the old Mogul palace at Agra.

To this day, "By the sack of Chitor" is the sacred oath of the Rajputs of Rajputana, while the citadel "sits an unveiled widow with face of sorrow, gazing over Mewar."

OUTWITTING THE WATER DEMONS OF KASHMIR

By Maurice Pratt Dunlap

With Photographs from the Author

PICTURE a lake of the clearest water nestling in a green valley and mirroring snow-capped mountains that tower above it to a height of 4,000 feet. You stand in a grove of chenar trees in a garden planned long ago by Mohammedan princes.

Across the water comes a fleet of boats rowed by dark-skinned men wearing bright turbans, who deftly cleave the surface with heart-shaped oars. They are evidently interested in certain objects in the water, and presently you see scores of swimmers making for the beach. They come ashore. There are nearly a hundred of them, and their firm, tawny, well-oiled bodies glisten in the early morning sunlight, as they sink exhausted on the grass after a three-mile swim across the lake.

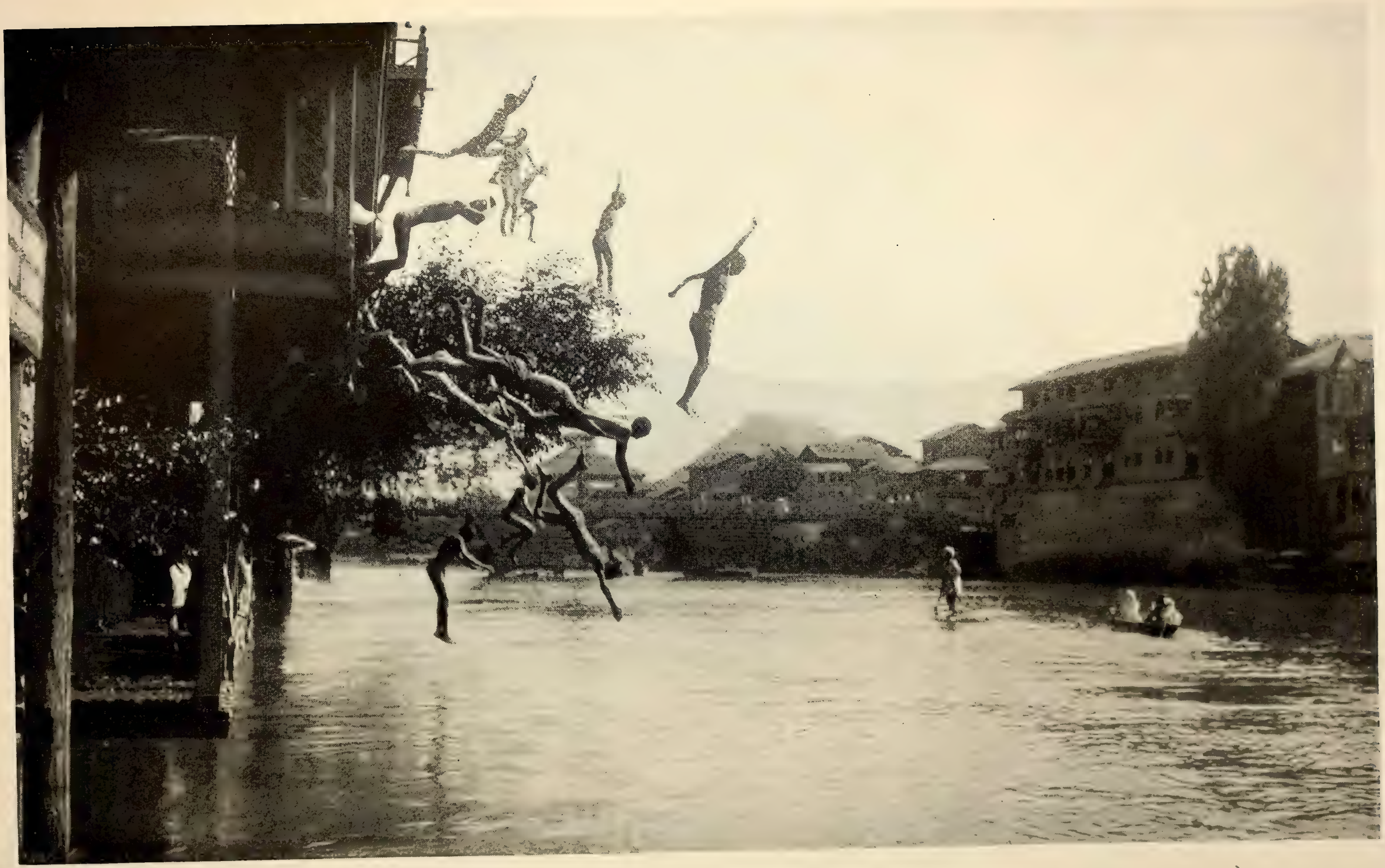
Who are these people? They are young men of Kashmir, that queer nook of a kingdom to the north of British India, shut in from all the world by the Himalayas. They are young men from good Mohammedan and Hindu families, who were taught for centuries that swimming was an ungentlemanly art. Their elders for generations, in twisted oriental logic, argued thus:

"Aristocratic children should not learn to swim, for if they learn they will often go into the water. If they often go into the water, they run a greater risk of being drowned than those that keep out of the water, because they cannot swim. Therefore they must not learn to swim."

Why, then, do these young men now swim and enjoy it? Why do they every year save many of their superstitious countrymen from drowning in this land of lakes and rivers?

THE ARRIVAL OF AN ENGLISH TEACHER

Over twenty years ago a young Englishman, Dr. C. E. Tyndale-Biscoe, assumed control of the Church Mission School of Kashmir, in Srinagar, which was attended by some 200 young men, many of whom went merely to learn



AN OBJECT LESSON IN OUTWITTING THE LEGENDARY WATER DEMONS OF KASHMIR (SEE TEXT, PAGE 511)

Before the establishment of the Church Mission School in Srinagar, it was considered "bad form" for aristocratic Hindu children to learn how to swim.

TEACHING BROTHERHOOD IN KASHMIR

Not only are the boys at the Church Mission School of Srinagar taught individual manliness, but also cooperation. Hindus, Mohammedans, and Christians all get along well with one another because each respects sincerity wherever he finds it.

PLAYING AN ANCIENT GAME AMID THE HIMALAYAS

Football, developed centuries ago in many parts of the world, is now being introduced to the turbaned sons of Kashmir mountaineers.

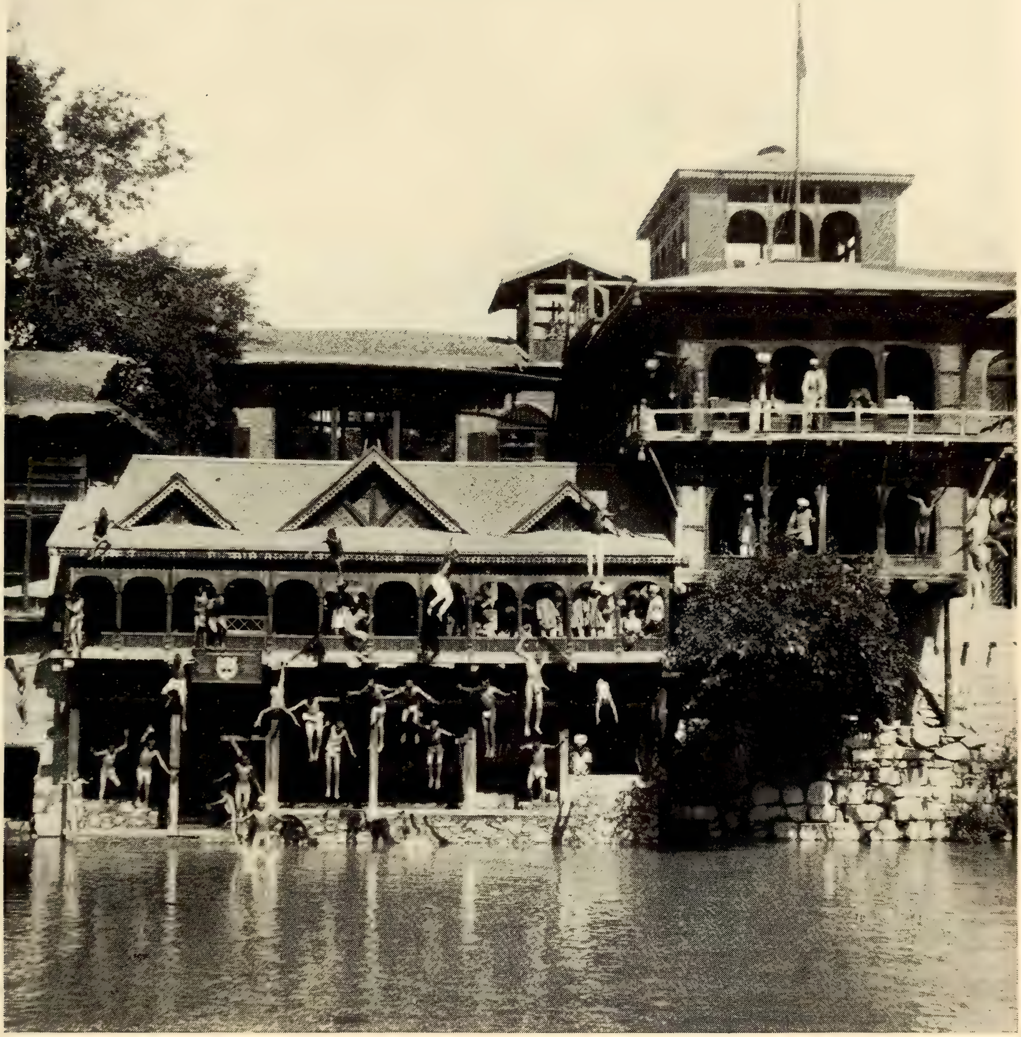
enough English and mathematics to pass the state examinations for civil-service employment.

This opportunist attitude on the part of physically lazy students caused this young Englishman to feel that perhaps English, mathematics, and other mental exercises were *not* the peculiar gifts that the West had to offer the East.

Here were people whose ancestors had scorned gymnastics and all manual or physical labor for thousands of years. Here were people who, with all their age-old philosophy, did not know that physical courage, reserve, and self-restraint, bred in the muscle and bone, would do more than fanaticism to make them strong. But the Anglo-Saxon knew this; and radical methods were used to teach the all-wise Kashmiri something he did not know.

NO LONGER "RICE CHRISTIANS"

Today the school has 600 pupils; but their number is of relatively small importance compared with the transformation in oriental character which has been effected.



NOT A SWIMMING CLUB, BUT A MISSION SCHOOL

The Jhelum River is not only a prominent highway of Kashmir's capital, but also one of the athletic fields of Dr. Biscoe's school.

These young men no longer attend school to pass the state examinations; nor are they "rice Christians," fawning on the foreigner merely to keep rice in their stomachs and clothes on their backs; nor do the Hindu, Mohammedan, and Christian students each associate exclusively with those of their own belief, as they do in some mission schools. They come from all ranks and castes.

Statesmen and missionaries from all over India journey thousands of miles to visit the school and study its methods. The Viceroy of India comes and commends, and so does the Maharajah, ruler of Kashmir's internal affairs, who represents the best and most powerful native element.

A UNIQUE SYSTEM OF GRADING PUPILS

No other one thing gives a better indication of originality of method than a glance at the "character form-sheet" that is made out for each pupil. A register is kept with a page for each boy, and three times a year his character is graded. The marks are classified in three divisions: Body, Mind, and Soul.

THE SPIRIT OF HENLEY TRANSPLANTED TO DAL LAKE: KASHMIR

Anglo-Saxon ideals of manliness are transforming historic Dal from the Lake of Love to the regatta setting where future leaders of the Far East are being trained. In this topsy-turvy land the men heretofore did the sewing, but now that the youths are giving more time to manly sports, the girls are being taught needle-work in schools of their own. They are also being taught to read and, what is much harder, to be clean. In the early days, the order that their heads should be washed once a month nearly caused a revolution.

Some of the subjects on which the pupil is tested are: gymnastics, boating, swimming, games, and manual labor; deportment, "absence of dirty tricks," self-control and cleanliness; obedience and honesty, pluck and unselfishness, esprit de corps, and duty to neighbors. English, mathematics, Sanskrit, Scripture, and other branches of study figure in the standings; but gymnastics count 400 points where English, Sanskrit, and mathematics count only 100 points each. "Pluck and unselfishness" count 300 points. Boating, swimming, deportment, cleanliness, and esprit de corps count 200 points each.

The teachers, most of whom are former pupils, try to bring out all the powers of each boy, so that he may not turn out merely a "swell-head," who, because he has passed examinations, thinks he is fitted to govern his fellow-men. No boy need go to the wall, for he has three strings to his bow: If he has not a good memory, he may excel in bodily prowess; and if he is physically weak or crippled, he can put forth his energy in excelling in soul subjects.

When a boy considers he has not been treated fairly by his teacher, the whole class is asked to decide the question. The resulting commendation or condemnation is thus the judgment of the boy's own fellows.

The subjects are not graded according to their relative importance, but according as a subject is popular or not with the boys. All the boys are as keen for mathematics as were their ancestors, but they inherit along with this keenness a distaste for gymnastics; so gymnastics count four times as much as mathematics.

BEST MARKS FOR THOSE WHO TRY HARDEST

In marking for athletic sports, the best marks are not necessarily given to those who excel, but to those who try hardest.

In foot-ball, for instance, Ram Chand, a timid little fellow, who is never likely to become a star of the game, receives more marks than Tara Chand, who is on one of the school teams, because Ram Chand has lost his father, the bread-winner, and is dependent on his mother, who ekes out a livelihood by spinning. Hence Ram Chand is always underfed and puny, while Tara Chand, being the son of a state official, is well cared for and more is naturally expected of him, as he has everything in his favor.

We have already seen some of the boys taking an early morning swim in Dal Lake. Let us go back to town with them.

Comfortably reclining in a gondola-like boat under a thatched shelter, we sail down the main "street" of Srinagar, the capital of Kashmir. In this quaint old city of 130,000 inhabitants most of the streets are waterways. Temples, mosques, palaces, and balconied buildings with grass and poppies growing on their roofs line the canals.

ALL THE BOYS SIT BAREFOOTED IN SCHOOL

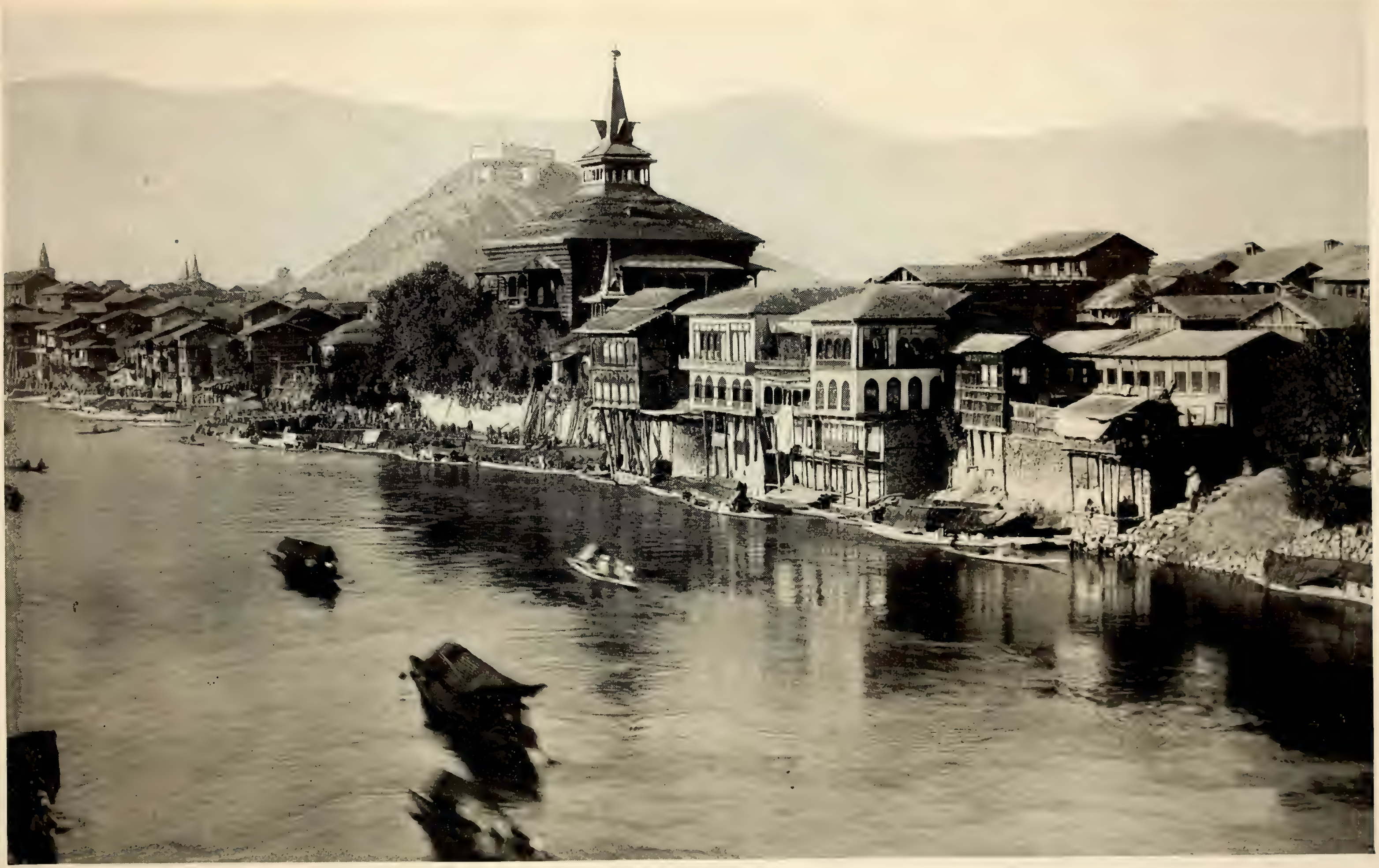
Here and there we have glimpses of rose-gardens and cool retreats in groves of chenar trees. One of the dilapidated structures with a goodly crop of hay growing on its roof is our destination. We disembark at a landing and ascend a steep flight of stairs.

On the veranda the boys leave their shoes—rows and rows of them, all sizes and shapes. This means that 600 boys are sitting barefoot within. No boy in Kashmir would think of entering his own home with his shoes on, any more than we would wear our hats in the house. It is an old Eastern custom.

But you will rarely meet this sight in other schools where the West is undertaking to teach the East. Too often the main idea in these institutions seems to be to graft our trivial customs on the oriental, making his exterior as occidental as possible, with the hope that his interior will follow suit.

The custom of leaving shoes at the door has one drawback in Kashmir: it gives an opportunity to the thief. The Kashmir people, who are noted for their comely features, their fine physiques, and their charm of manner, are also notorious for thievery. When a thievishly inclined boy comes to school with old shoes, he will sometimes leave early in order to take away a pair of newer ones.

If the boy is found out, his punishment fits the crime. The shoes are tied around his neck, so that he may have them always in view. At such tricks, the high-caste Brahmins seem to be the worst offenders.



THE "MAIN STREET" OF THE CAPITAL OF KASHMIR SUGGESTS A VENETIAN CANAL

The winding Jhelum River is the principal thoroughfare of Srinagar and along its storied banks rise temples, mosques, palaces, and balconied buildings whose roofs bloom with grass and poppies. The spired building is the Shah Hamadan mosque (see also page 524). The citadel in the distance was built by Akbar, the Mogul emperor.

The boys are just answering roll-call as we enter the main assembly-room, which is most interestingly decorated. There is one religious picture, "The Light of the World," hanging over the dais that faces the pupils. Portraits of King Edward VII and the present King-Emperor hang near by, along with one of the Maharajah of Kashmir, who is the real ruler of internal affairs and whose imposing palace we passed as we came down the river (see page 510).

Above all is the school crest—a pair of heart-shaped paddles, crossed, and the words "In all things be men."

THE TOP CLASS, NOT THE TOP BOYS, REWARDED

Four honor boards are always kept before the eyes of these impressionable orientals. On one are the names of those who have distinguished themselves for pluck, skill, and endurance, such as those who have swum the most dreaded lake in Kashmir, five miles across. On another are the names of the two head boys for every year since Dr. Biscoe took charge. On the third are the names of sixteen lads who have risked their lives for others. On the last there is just one name, that of a boy who died saving his brother from drowning.

Familiarity with the oriental mind is revealed in the school attitude toward prizes. Individual rewards are not made, for the eagerness to appear better than one's fellows is so keen with the Kashmir youth that he will resort to dishonest tricks to attain his end.

Instead of rewarding the top boys of the classes, a prize is given to the top class of the school—that is, the class which obtains the highest average in all-round standing as revealed by the character sheets. The boys divide the prize among themselves or keep it for the community.

The orthodox custom of rewarding the top boys of classes does not necessarily result in the boy who works the hardest getting the prize.

Often, in the average school, the boy with natural gifts of memory, rather than the dull plodder who needs encouragement, gains the prize. With Kashmir boys, this tends to bring out undesirable traits, for the top boys may cheat, and even try to bribe their masters, to gain an individual reward.

At the Church Mission School the bright boys in a class know that their weaker fellows are likely to bring down the mark of the whole class, and therefore there is coöperation between the two groups. In this way esprit de corps is developed, and this in turn is recognized and a special mark given for it.

A Burmese gong booms to remind us that the half-hour recess for gymnastics has arrived. The Junior School of 300 comes out first; then the Upper School of 300, for the playground will not accommodate all at once.

Are these languid sons of the East we are watching, or an occidental class in gymnastics, exercising amid strange surroundings and in bizarre costumes? In twenty-five seconds all are assembled. The boys from the upper stories come sliding down poles like firemen responding to an alarm.

The school band strikes up a tune and in a few seconds the inclosure is alive with swinging, whirling, jumping, fencing, boxing boys.

HOW BOXING WAS INTRODUCED

Boxing was introduced under unusual circumstances. At first these young men always knew "a little more" about every subject than their instructors did. A professor was talking about Ceylon and happened to mention that his brothers had visited the island.

"That is impossible," stated a supercilious Brahmin. "Ceylon is the home of the Hindu gods, and the holy books teach us that no infidel may go there."

This cocksureness was too much for the Anglo-Saxon, to whom discipline in thought and in school administration were very dear. He produced two pairs of boxing gloves and suggested, "As you seem to know everything, you probably know how to use these gloves."

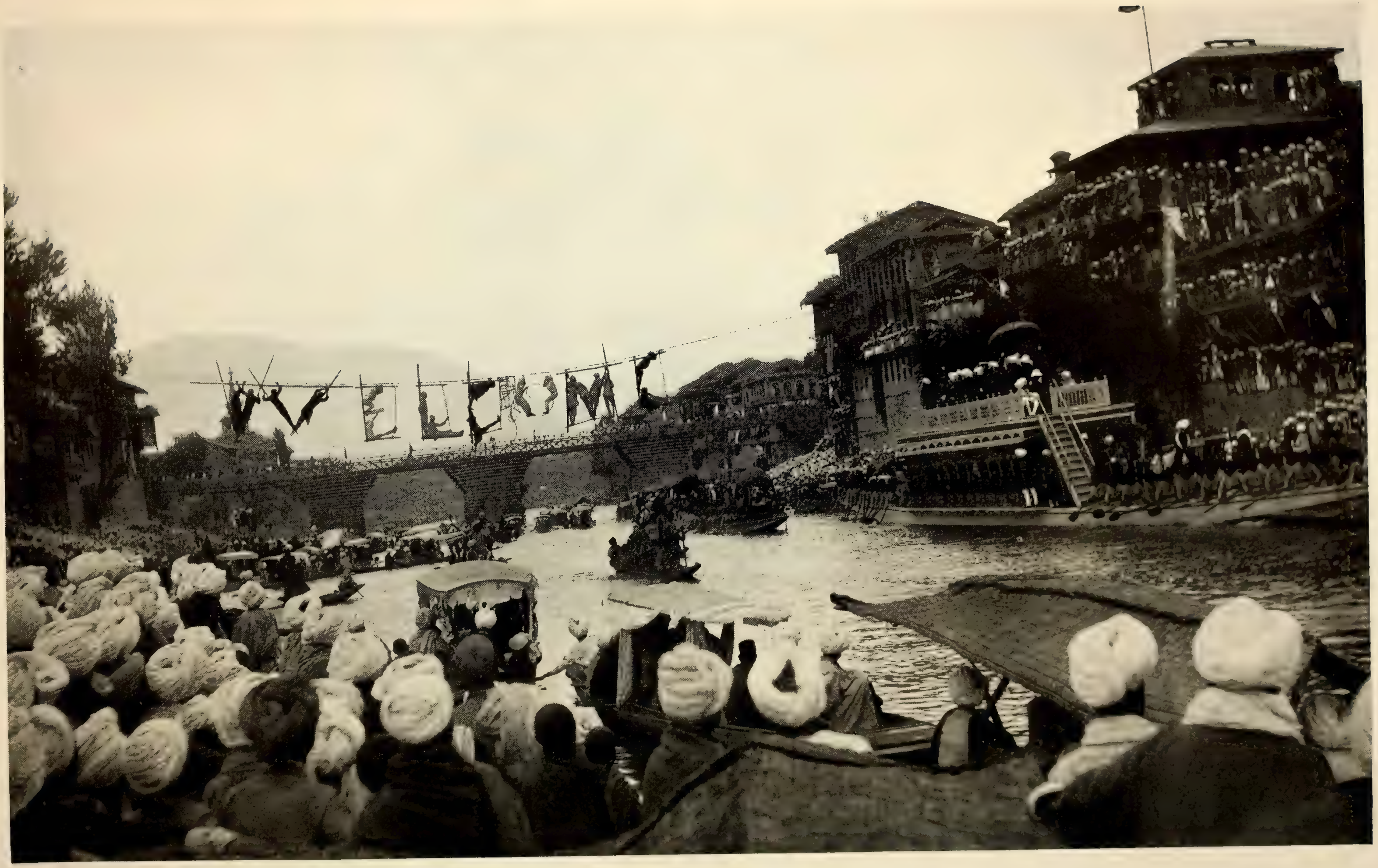
"Yes," said the all-wise youth, "I know."

"Why not give the class a practical demonstration of that truth?" the instructor suggested.

The gloves were put on.

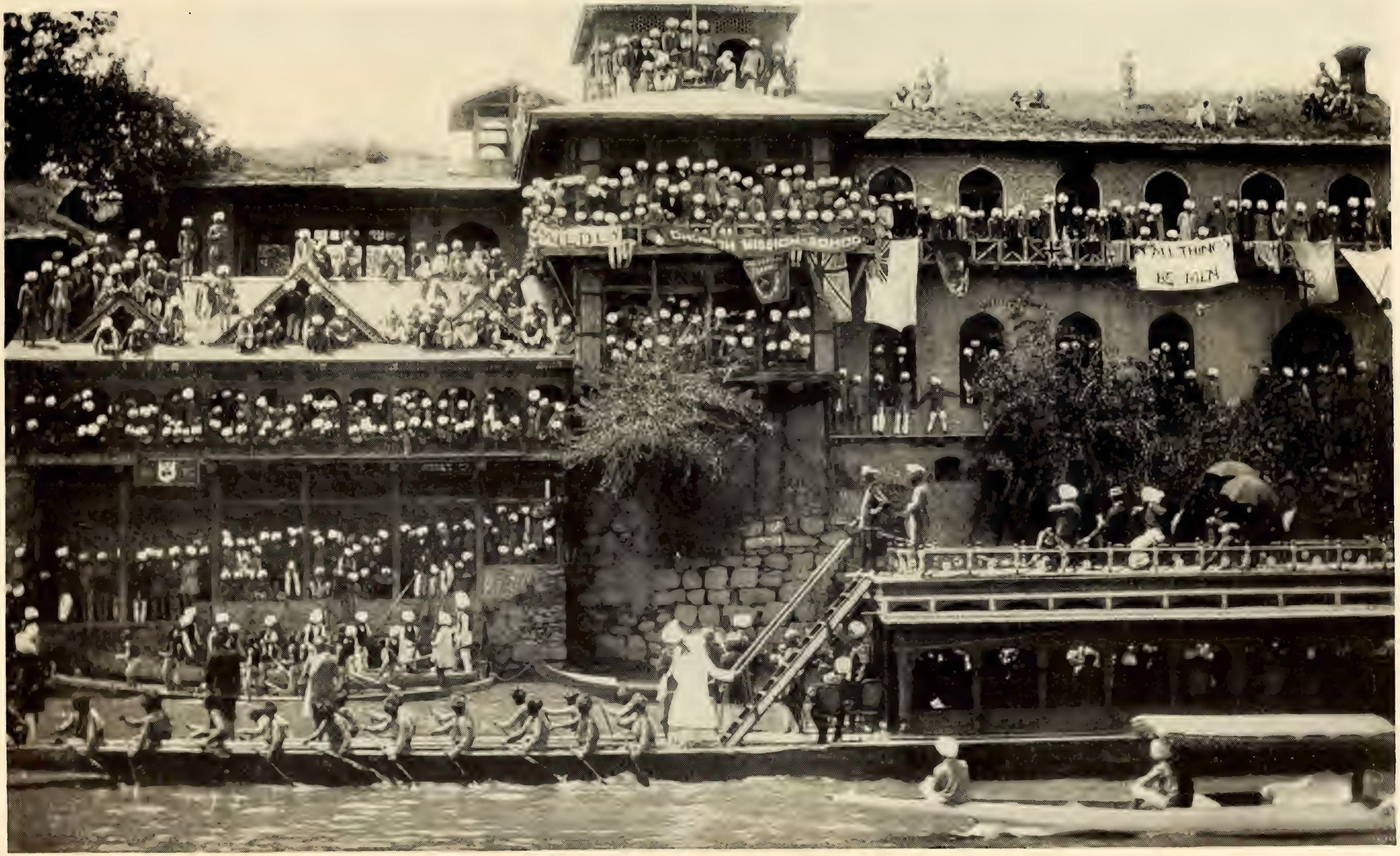
"Can you prevent me from hitting your nose three times running?"

"Certainly," said the confident student.



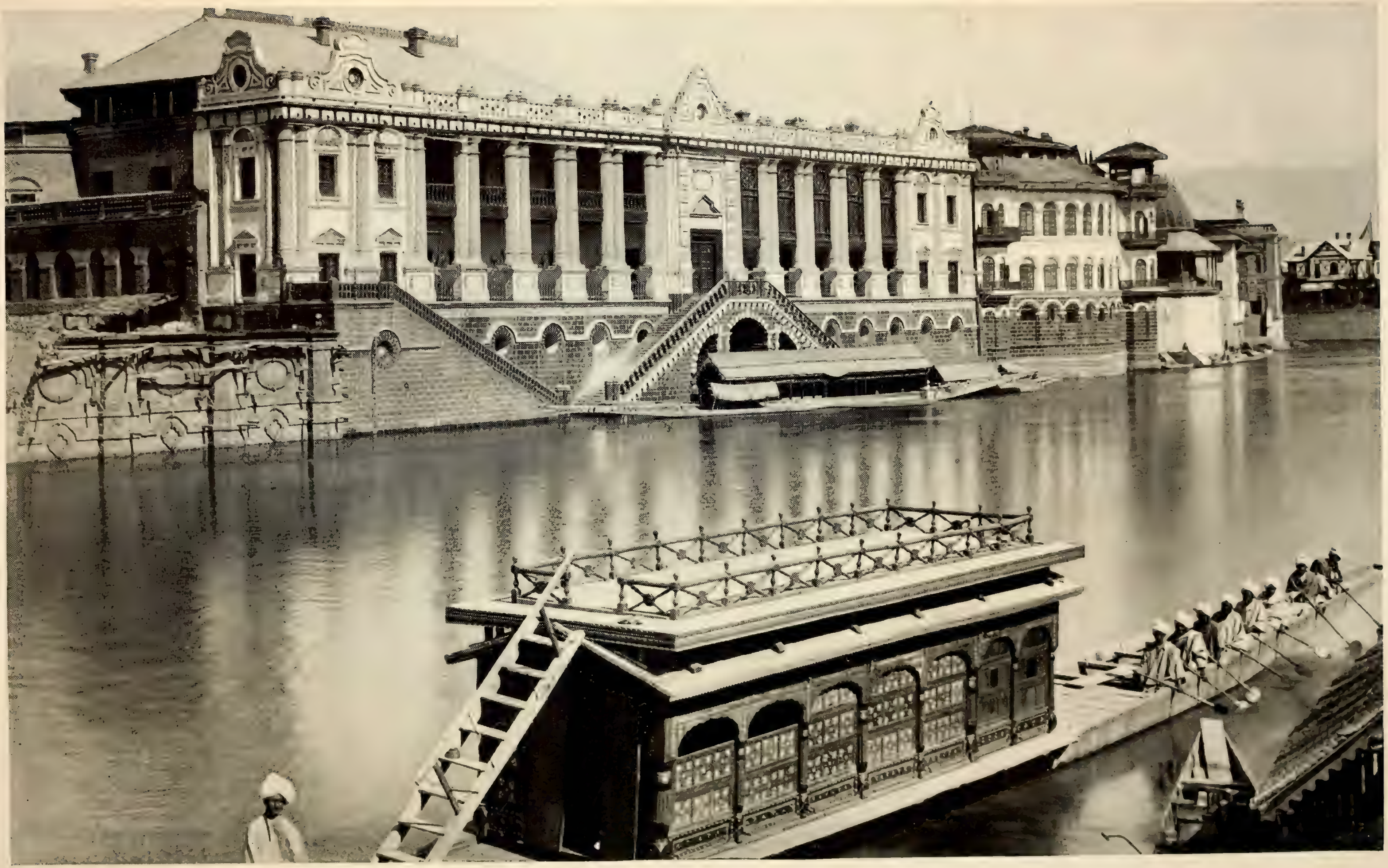
A VICEROYAL WELCOME IN KASHMIR

Not content with cheers and crowds testifying to the sincerity of Srinagar's friendship, the school boys strung across the Jhelum River an 18 boy-power sign visualizing their greeting to the British Viceroy on his visit to the capital of Kashmir.



WELCOMING NATIVE ROYALTY TO KASHMIR'S FAMOUS SCHOOL

The arrival of the royal barge of the Maharajah of Kashmir and Jammu at the Church Mission School at Srinagar. The school motto, "In all things be men," is seen on the banner at the right.



THE SHER GARHI, PALACE OF THE MAHARAJAH OF KASHMIR AND JAMMU, WITH THE ROYAL BARGE IN THE FOREGROUND

Kashmir's ruler, a Dogra Rajput by caste and a Hindu in religion, is the chief of state in a province two-thirds of whose people are Mohammedans. His winter palace is in Jammu, 4,000 feet lower than Srinagar and 184 miles to the south.

"Are you ready?"

"Yes."

Bang went the teacher's left to the nose of his pupil.

"I thought you could defend your nose!"

"Ye-es, I can."

The all-knowing Brahmin covers his face, leaving a chink for one eye.

"Are you ready?"

"Yes."

The teacher makes a feint at his opponent's stomach. Down comes the oriental glove to protect it, and a turbaned head comes forward so that a Kashmir nose meets an Anglo-Saxon fist. That is enough. The erstwhile omniscient student owns before the class that he does *not* know boxing and *cannot* take care of his own facial property.

Gymnastics being over, the boys form a squad and stand at attention while a prayer is said for the King-Emperor and the Maharajah. Crowds of handsome bearded men have been dropping in from the street to watch the performance, as they do daily throughout the school year. They seem both impressed and interested, as the band breaks forth in another march and the boys file back to their class-rooms.

A THRILLING REGATTA

There is to be one of the frequent regattas in the afternoon, so we go back to the beautiful lake where we saw the early morning swimmers. It is a gay sight. There are more than 100 boys in all manner of craft. We go out in a little boat of our own, reclining at ease on a Kashmir rug, while lithe-limbed boatmen pole the craft along.

Suddenly every boat except our own turns turtle. But the boys don't seem to mind. They are splashing about the water in lively fashion. Then they turn the boats right side up, bale them out, jump back in, and paddle toward the city. It is all part of the game, to teach them how to act in the real emergencies that happen so frequently on these mountain lakes.

The Kashmiris in general, except the boatman caste, not only do not learn to swim, but think that if they are upset in a squall water demons will catch them, whether they swim or not. What these young men have learned has gone a long way to convince the people of Kashmir that a high-caste gentleman does not necessarily need to drown merely because he falls into the water. The rule is that every boy must pass a swimming test before his fourteenth birthday.

When compulsory swimming was first introduced, more than 100 boys were withdrawn from the school.

Besides parental objection, the boys themselves were timid. It was six years before a crew of aristocratic youths in a racing boat sculled down the main "street" of Srinagar, and every rower had a blanket tied around his head to disguise himself from the jeering crowds that lined the bridges.

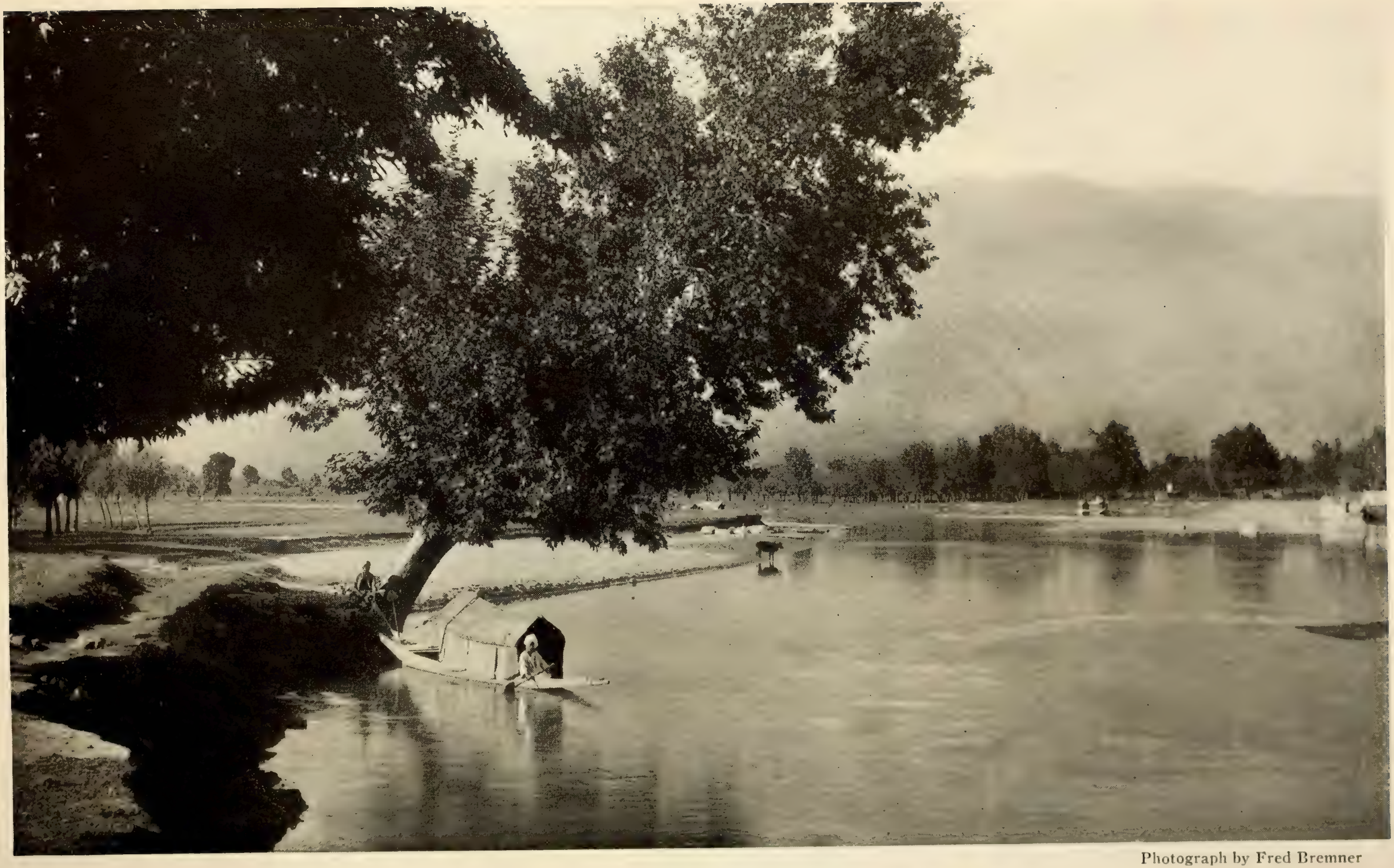
Now, however, things have changed. The school has turned out thousands of swimmers who are not only competent to save life, but also to teach others to swim.

Twenty years ago the picture was quite different. Some 200 dirty, evil-smelling human beings squatted on the hall floor with mouths open and with vacant expressions. They all wore the holy marks of the Brahmin, a great smear of red paint across their foreheads, but were busy devouring the wisdom of the West, for this wisdom meant state employment, and that meant rupees. The salary might not count for much, but the opportunity to squeeze out bribes in other ways, as their forefathers had done, was more attractive.

These creatures, some of whom were 20 years old and had black, bushy beards from ear to ear, were called "boys." Jelly-fish would have been a more appropriate term.

The boys of the school no longer belong to the jelly-fish type, and the fame of the school is no longer confined to Kashmir. It is known throughout India, among the workers who are striving for the regeneration of the East.

These workers—both British and American—travel into this remote country during their vacations to learn wherein the success of this school of Srinagar lies. It was with two of these educational missionaries that the writer made a journey to Kashmir. One result of such pilgrimages is that athletics are being more generally emphasized in the mission schools of the Ganges Valley.



Photograph by Fred Bremner

A CURVE IN THE JHELUM RIVER: KASHMIR

Most westerly of the "five rivers" from which the Punjab derives its name, the Jhelum combines placid peace and torrential haste along its varied course. When it reaches British India, it is put to work. More than 1,800 miles of irrigation canals and ditches are fed by its waters.

A PILGRIMAGE TO AMERNATH, HIMALAYAN SHRINE OF THE HINDU FAITH

By Louise Ahl Jessop

FAR up in the northwestern part of India lies the Kingdom of Kashmir. It includes Baltistan in the north, Ladakh in the east, Gilgit, Hunza, and Chitral in the northwest, Jammu in the south, and the beautiful Vale of Kashmir in the southwest. The kingdom has an area of 80,000 square miles and a population of nearly 3,000,000, of whom about three-fourths are Mohammedans, a fifth Hindus, and the rest Buddhists and Sikhs. It is ruled by a native prince under British protection.

The history of the country goes back for many centuries, and at one time it was one of the two most powerful kingdoms in northern India, but later suffered from invasion after invasion and was conquered and reconquered. It was reduced by Akbar, the great Mogul emperor, and its lovely Vale became the favorite summer resort of his son Jahangir and his queen, the beautiful Nur Mahal. Their pleasure in this Garden of Eden, as portrayed in "Lalla Rookh," has made it famous the world over.

"Who has not heard of the Vale of Cashmere,
With its roses the brightest that earth ever gave,
Its temples, and grottos and fountains as clear
As the love-lighted eyes that hang over their wave?"

And who that has read the musical "Lalla Rookh" has not had a desire to see this land of romance and of song? To many this desire has been but a passing thought, because of the seeming impossibility of accomplishing it from faraway countries; to others it has been a dream to be realized, perhaps in the distant future; comparatively few actually enter the enchanted land.

When, therefore, it was finally decided that we could spend our holiday in Kashmir, all dreamers can imagine better than I can describe our feelings of anticipation and delight. With guide-books and maps we set about the interesting task of tracing routes and deciding upon how we could crowd into the brief space of five weeks what should require double that time.

Soon from the jumble of strange towns, mountains, and camps, Amernath, one of the Meccas of Hindu pilgrims, stood out as our objective point and as the most desirable thing to see. Thus our trip was planned to lead us to that rock cave as a fitting climax to the whole.

FROM CALCUTTA TO KASHMIR

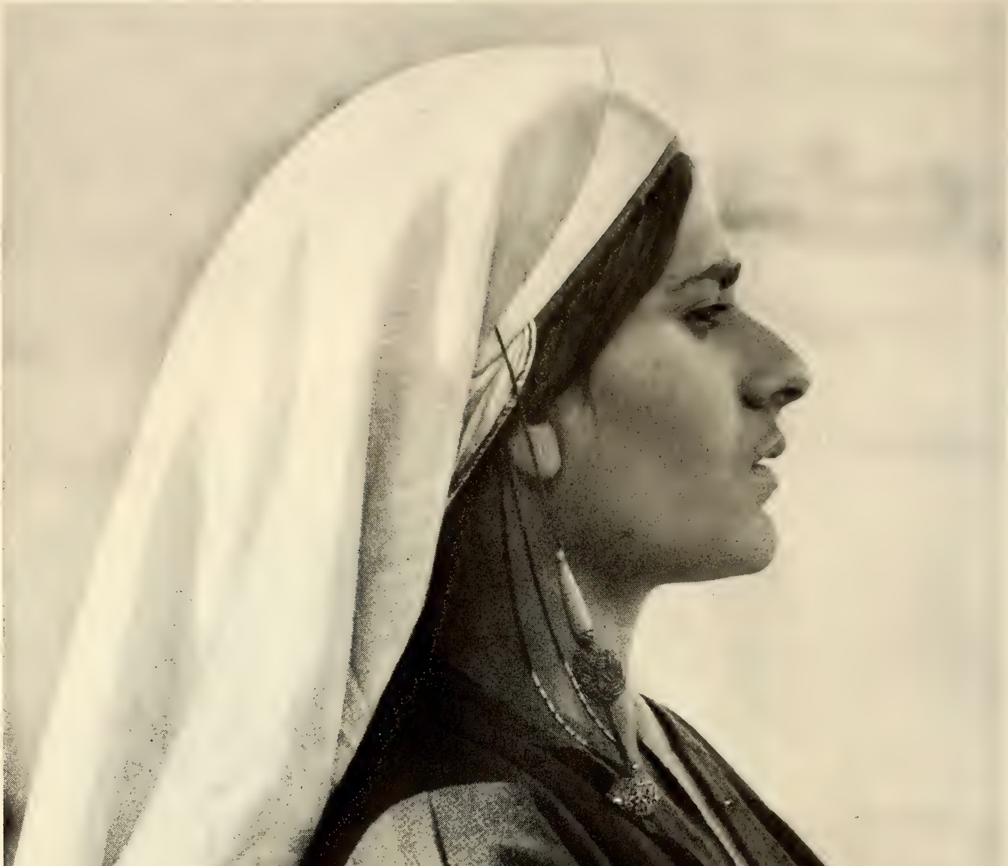
Kashmir, spelled with a "K" today, is a far cry from Calcutta, and one travels many hundred miles even before standing upon its threshold. Our way lay toward the northwest, up through Bengal, the United Provinces, and the Punjab, past the sacred city of Benares, Cawnpore of Mutiny fame, Agra with its royal Taj Mahal, and Delhi, the old-new imperial capital, on to Rawalpindi, the largest military cantonment in India.

Here we left the railway and started on our long drive of 200 miles to Srinagar, the capital of Kashmir.

The vehicles were waiting for us at the Rawalpindi station, as was the wily creature to whom they belonged and with whom we tried to make as iron-clad a *bundbust* (contract) as was possible. Needless to say, there was a vulnerable place therein, as is usually the case out here, and it cost us a long parley on our return journey.

To the uninitiated Westerner, who travels mostly in trunks and neat leather suit-cases, it is hopeless to attempt to picture our party of five as we started off in a landau and two *tongas* with our twenty-nine pieces of luggage. Our British cousins are right; this was luggage, not baggage.

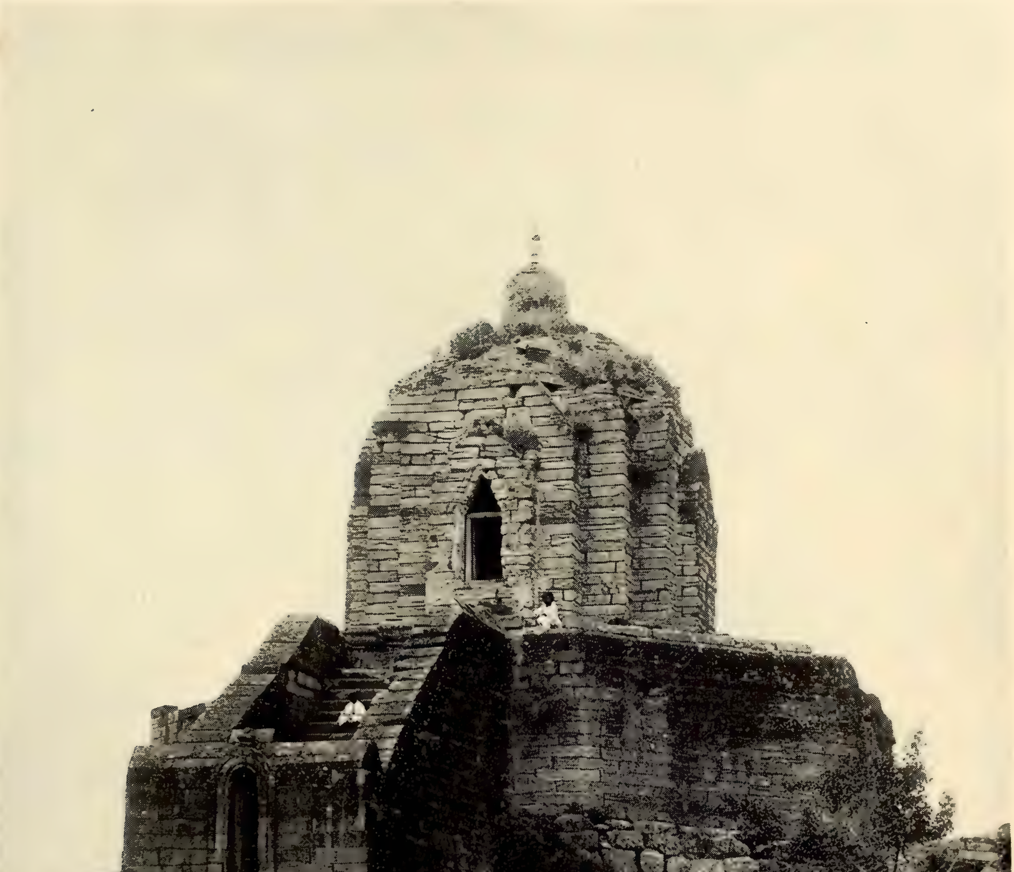
The three ladies occupied the landau, which, with its skinny horses, wabbly wheels, shabby top, and general tumbledown appearance, looked as if it were a relic of the days of Warren Hastings. In front of us, behind us, around us, and, I was going to say, on top of us were



Photograph by Fred Bremner

A DAUGHTER OF NOAH ON DAL LAKE: KASHMIR

Conservative, clever, contented, the Kashmiris have remained unchanged amid successive invasions. The boatmen and their wives lay claim to inherited skill in their craft, naming that Ancient Mariner, Noah, as their ancestor. Srinagar is subject to periodic floods, and the story of the Ark sounds more familiar to its people than to the Rajputs of the barren plain.



Photograph from M. M. Shoemaker

AN ANCIENT HINDU TEMPLE ON SOLOMON'S THRONE: KASHMIR

Two intimate hills look down on Srinagar and frame the view of mountain and lake beyond. The higher one is known as the Throne of Solomon, upon which stands this, the oldest temple in Kashmir.

Photograph from William Jessop

THE START FOR KASHMIR!

If variety is the spice of life, a half-starved horse, a "one-hoss shay" *tonga,* and a Kashmir mountain road form a rare combination. Anything may happen and almost everything does (see text below).

packed huge bedding rolls, rain cloaks, tiffin baskets, and cameras.

The gentlemen and the remainder of the twenty-nine varieties, including two boxes of tinned provisions, occupied the *tongas,* which, for their size, are marvels of capacity. They are two-wheeled vehicles capable of accommodating four persons, each two sitting back to back, and boxes are stowed under the seats and under the feet, while bedding rolls and lighter articles are tied to the sides and on the top.

THROUGH A COUNTRYSIDE RESEMBLING PENNSYLVANIA

At last, about 9 o'clock, all the numerous details were arranged and we were off for Tret, 25 miles on the way and our next stopping place. The first 10 miles were across a level valley, with green grain patches and plowed land stretching back to the hills on either side. It might have been a country scene in part of my own Pennsylvania, except for the thatched mud huts and the eastern dress of the natives.

Further along the road enters low hills and the view is pleasantly varied.

As we went careering along the road mile after mile, around bends, up hill and down hill, the light tops swayed, the wheels creaked, and at times the harness gave way, so that we often wondered whether our journey would be completed without serious mishap. It was, however, in spite of the fact that a passing *tonga* caught the wheel of our landau in too close an embrace and loosened the iron from its hub.

The accident caused us the loss of a precious hour or more while the drivers tinkered it to hold with rope. Plenty of rope and five-gallon kerosene tins will carry one through almost any crisis in India.

Three miles from Tret the main ascent begins and we climbed a spur of pine-clad hills to the dak-bungalow, 4,000 feet above sea-level.

Dak-bungalows are rest-houses built by the government and situated every 12 or 15 miles along roads away from the railway. They vary in size from two to five or six rooms and are in charge of a care-taker. Those on much-traveled highways also have caterers, and meals can be ordered at short notice for a small sum. Any one may stay 24 hours upon the payment of a rupee (32 cents), which entitles him to a room and bed, usually with mattress and pillow, but no sheets or blankets.

The bungalow at Tret was most comfortable, and the warm baths, which we had for a few annas extra (at normal exchange an anna is worth about two cents), were very refreshing after our hot, dusty journey. A servant, whom we took along for the sake of economy, cooked our food all during the pilgrimage, effecting quite a saving with a party of five. On the railways, a servant's fare is about a third of a cent a mile.

CARAVANS OF CARTS LADEN WITH KASHMIR FRUIT

The road from Tret to Kohala, 38 miles away, lay through beautiful pines, and at a turn a mile or two up we had a wonderful view of the hills—those in the foreground bare and brown, those behind fresh and green, with the bungalow we had just left nestling at their feet.

We passed many caravans of ox-garries, piled high with baskets of fruit from Kashmir. Pieces of matting or canvas supported by a pole in the center form a gable roof over such precious cargo, protecting it from sun and rain and helping to insure its delivery in good condition to the markets of India, even after such a long, slow journey.

Photograph by A. Hodgson

A ROCK TUNNEL ON THE ROAD TO SRINAGAR

Until recently, the two routes into the Happy Valley of Kashmir, from Jammu across the Banihal Pass and from Gujerat over the Pir Panjal, rivaled the Murree road; but the latter has been much improved and now motor cars make the 200-mile trip from Rawalpindi to Srinagar in two days.

The ascent in the next 11 miles to Sunnybank, two miles below Murree, was over 2,000 feet. Progress was slow with our lumbering vehicles and we walked part of the way to stretch our legs.

Murree, one of the popular hill stations of the Punjab, we did not enter, but as we began the long descent of 27 miles from Sunnybank we saw it straggling along the crest of a pine-covered hill which farther down was cultivated in terrace after terrace of growing grain.

Our road on the left of the valley wound around high cliffs, out of which it was cut. To the right, the hills, sparsely covered with scrub trees, stretched away, seamed and gullied and rolling like the waves of the ocean, to others behind, jagged and peaked, the whole by some mysterious action of the sunlight wrapped in a haze of palest rose.

At each turn in the road the scene changed in a kaleidoscopic manner, and we admired the same hills from a different viewpoint. About six miles from Kohala the Jhelum River, a rapid rushing stream fed by the snows, came into view, and we scarcely lost sight of it until we left Islamabad, many days later.

How good the Kohala dak-bungalow seemed that night, with its refreshing baths, comfortable beds, and excellent dinner of six courses, although we did read afterward in the guest-book unfavorable comments on the dinner written by two cranks.

Photograph by William Jessop

A WAYSIDE STOPPING PLACE ON THE MURREE ROAD

Each night we planned to leave early the next day, and each morning, struggle as we would, we were late getting off. The start always meant, besides breakfast, putting up the bedding rolls and seeing that the twenty-nine pieces of luggage were carried down a steep hill and repacked on our conveyances.

There was often a dispute about reloading, and the stronger drivers would try to bully the weaker ones into carrying more than their share. So if the sahibs hadn't given some rather peremptory orders, the day would have been well advanced before the start.

FOLLOWING THE COURSE OF THE RIVER JHELUM

The morning was bright, clear, and warm, for Kohala is only 2,000 feet above sea-level. After securing permits, we crossed the fine new suspension bridge over the Jhelum and passed into Kashmir.

There was a drive of 55 miles ahead of us, as we wished to reach Chakothi that night. The landau led the procession, and our driver was determined that we should stop at Garhi.

When an Indian *gari-walla* (driver) makes up his mind to a thing, a memsahib's (woman's) protests are of little avail. Either the ascent or descent is too steep, or the horses will give out, or, as a last resort, he grows most solicitous about the condition of the animals and must stop frequently to feed and water them.

It is astonishing, however, how quickly the horses revive and all adverse conditions disappear upon the offer of baksheesh. The only difficulty about this plan is that, used indiscriminately, it means being held up constantly for extra pay, and it becomes expensive as well as annoying. However, by a judicious mixture of sternness and bribery from the sahibs, we accomplished our purpose.

It was a long day, but very interesting. After crossing the suspension bridge, the valley is very narrow, little wider than the river, which is here a mountain torrent.

The road winds along the left bank of the Jhelum and is cut out of the side of precipitous hills, down which landslides often come. Indeed, near the bridge is a sign, "Danger! Beware of boulders!" which is rather amusing, for who can stop a boulder, even if he does beware? In many places so lightly are they poised that it seems as if a passing *tonga* would dislodge them. In other places the bank is a cliff of almost solid rock and one passes through several picturesque rock tunnels (p. 517).

Farther on, the valley widens into a cultivated plain. Much Indian corn grows in Kashmir, and I remember one patch in which it entirely surrounded the cultivator's hut and was higher than its roof.

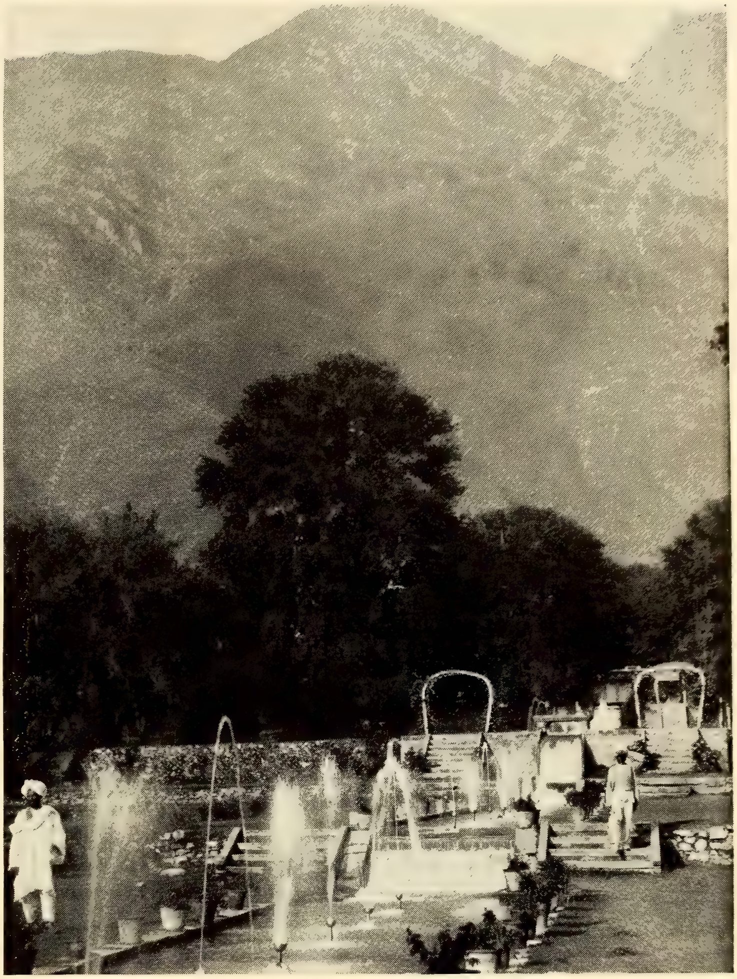
A MOUNTAIN HIGHWAY THAT COST MANY LIVES

Near Chakothi the valley becomes very narrow again and the road is a dizzy height above the foaming torrent. Night came on as we wound around high cliffs to our right, with dangerous precipices to our left, and we clung to each other as we crossed bridges over some of these terrible khuds.

After leaving Chakothi one passes some of the most stupendous cuttings in India, the road in places being dug out of the solid rock, with sheer cliffs 250 feet high overhanging it on one side and a dizzy drop of the same distance to the river on the other. This road from Kohala to Baramula, 98 miles, is considered a wonderful feat of modern engineering. It was begun in 1880 and formally opened for traffic ten years later. It cost many lakhs of rupees and many lives. In one section alone, in the course of four years, 54 men were killed. This is now one of the best mountain roads in the world, and many tourists are attracted to Kashmir, which means great prosperity for the country.

At Baramula we were greatly interested in the pretty Kashmir-Swiss cottage type of house, usually two stories high, sometimes four. The upper stories often project over the lower, being supported by piles, and the fronts are quite elaborately carved. The latticed casement windows are covered with paper in the winter to keep out the cold, for only a few of the richest can afford glass.

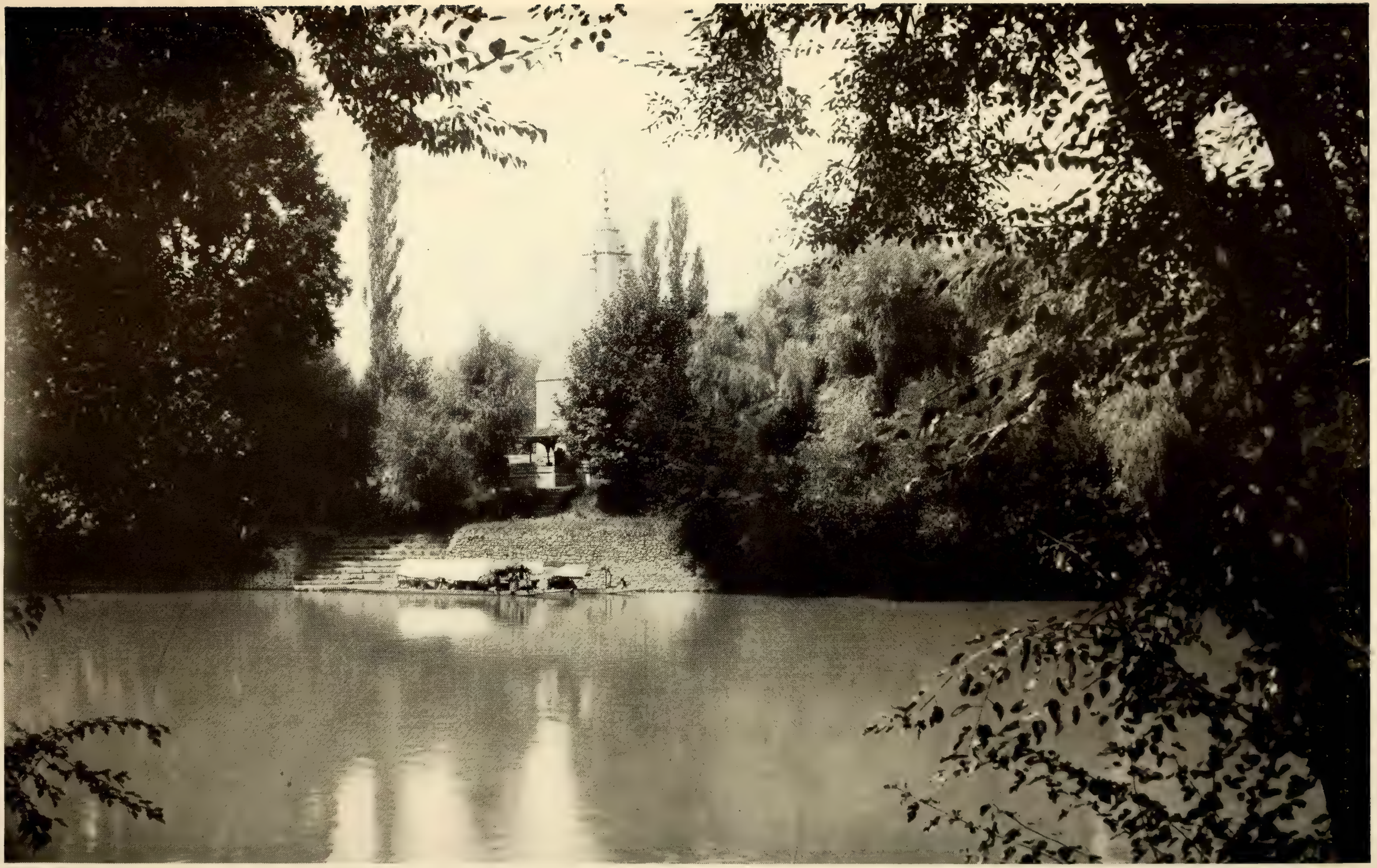
Here the road leaves the river and the



Photograph from M. M. Shoemaker

THE CRYSTAL FOUNTAINS OF A KASHMIR GARDEN

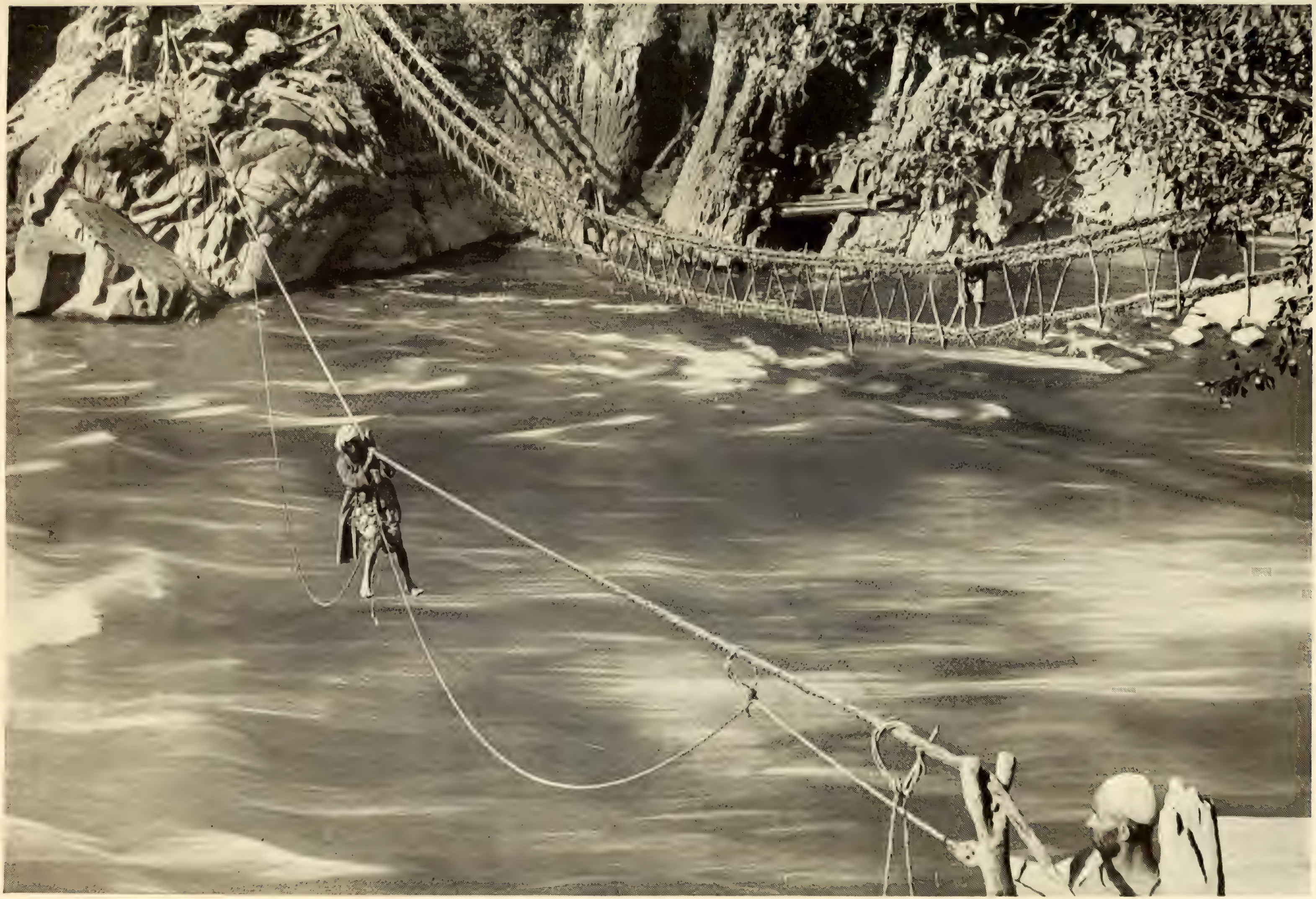
Near Srinagar there are three famous formal gardens—the Nishat Bagh, pictured above; the Shalimar Bagh, beloved of Nur Mahal, and Nasim Bagh, across Dal Lake from the first two. Few scenes are lovelier than the terraced pools separated by the lace of falling waters and embroidered with the pearls which constantly drop from the fountain spray.



Photograph from M. M. Shoemaker

A SNOWY TEMPLE BESIDE STILL WATERS

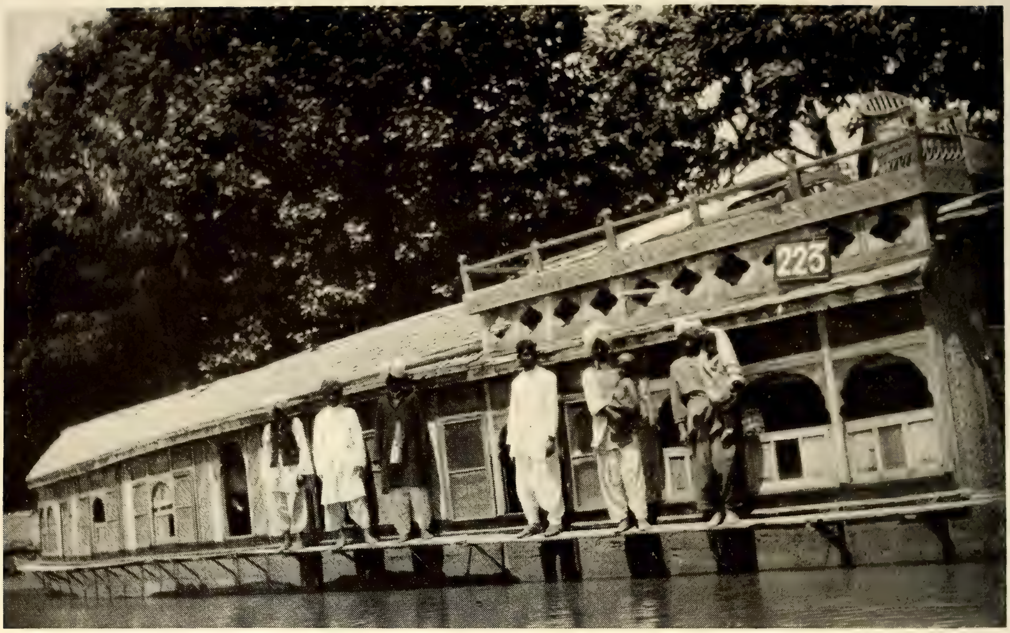
It is no wonder that the Moguls from the dusty plain around Delhi and the rough mountaineers from the crags of Kashmir regarded Dal Lake as the peaceful heart of Happy Valley (see also Color Plate IV).



Photograph by Fred Bremner

A SUSPENSION BRIDGE ACROSS THE JHELUM RIVER

Between Baramula and Domel the only bridges over the Jhelum River are frail affairs made of birch twig ropes spread apart by V-shaped cross-pieces. It's no pleasant pastime for those who are not sure-footed to cross a turbulent river in this way. Sometimes a line of rude cable, over which a man is drawn ferry-wise, supplements the swinging bridge to the right.



Photograph by E. Moffat

A FLOATING SUMMER HOME

So delightful are house-boat days in Kashmir that most visitors utilize floating dwellings instead of hotels. Such a boat not only has four rooms and two baths, with a sun deck on top, but also an open fireplace for cool evenings beyond the Pir Panjal range, which separates the temperate plateau of Kashmir from the hot plains of India.

valley widens until the hills are indistinct masses of blue haze. Most of the 35-mile road to Srinagar lies between rows of tall poplars planted very close together.

Baramula is the gateway to the Vale of Kashmir, where one's thoughts so often bridge the gap of the years to

. . . "the magnificent son of Acbar,
When from pow'r and pomp and the trophies of war
He flew to that valley, forgetting them all,
With the light of the harem, his young Nourmahal."

This valley of blissful memory is an oval basin 80 miles long and 20 broad, extending from southeast to northwest. "It is girt by mighty mountain ranges, many of the peaks of which are higher than Mont Blanc. These are the pearls which encircle the emerald valley."

RAHIM KAHN, PRESIDING GENIUS OF THE PILGRIMAGE

We reached Srinagar, the capital, after a drive of three days and a half, although this distance can be covered in two by mail *tonga* or motor.

At the post-office we were met by Rahim Kahn, the presiding genius of our destinies for the next three weeks, and escorted to the house-boat which was to be our home, off and on, for that time.

He at once took us in charge, bought for us, cooked for us, made our *bundbust,* guided us—in short, managed us, usually at a considerable profit to himself. He was cheerful, deferential, faithful, and fertile in resources and always made a show of carrying out our wishes, although when differences of opinion occurred things usually worked out according to his program in such a roundabout way that we could only guess the process and wait for results.

His *hissabs* (daily accounts) were marvels of increase in the cost of living, and when we firmly objected to being charged Calcutta prices, his air of injured innocence made us feel like petty tyrants and often won the day for him.

He was, in short, such a polite and comfortable rascal that we overlooked much and forgave more. He got his *chits* (letters of recommendation) and the Rs. 18/- for his last *hissab,* which was presented a minute before we started

Photograph by William Jessop

AN AQUATIC RUNABOUT

The *shikara* is built for speed rather than capacity. Four oarsmen, using heart-shaped paddles, can propel such a craft at almost motor-boat speed.

back to Rawalpindi, although we could never quite figure it out.

IN A VENICE OF THE EAST

Upon the charm of Suryya Nagar (Srinagar) I cannot dwell. This Venice of the East, with its fascinating water life, its beautiful embroideries, silverware, beaten copper, carved woodwork, papier-mâché done after old Persian designs, its brass, silk, and precious stones, casts over one a sort of spell from which it is hard to escape.

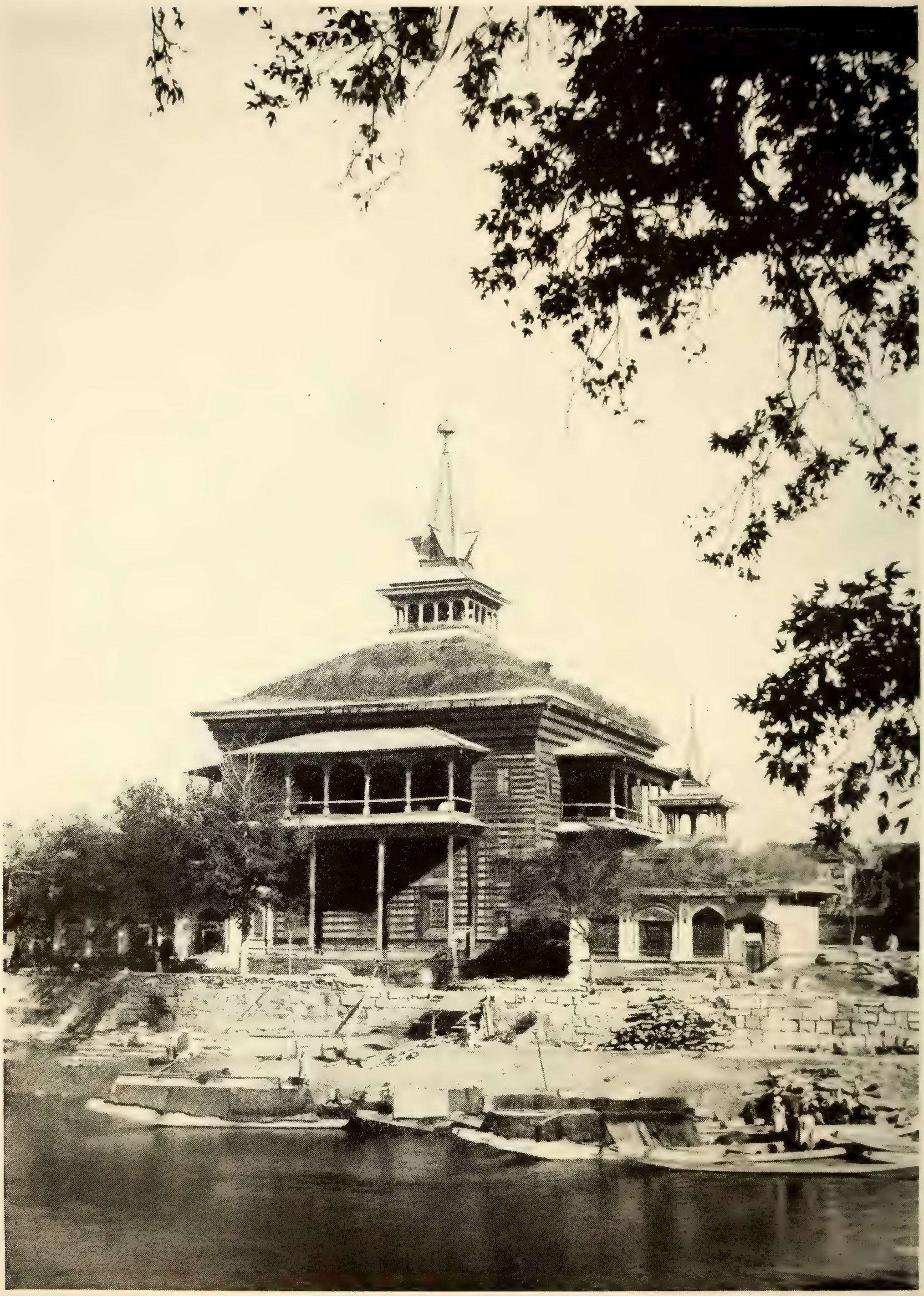
"I will away," we say and in the same breath plead with ourselves for further delay. The temptation is strong to give up the mountain trip and laze away the days in this interesting City of the Sun.

We must harden our hearts if we are really to reach Amernath and reluctantly the order is given to go up the river to Islamabad. How peaceful and restful those three days were, as we were towed and poled up that quiet, sluggish stream, with nothing to do but eat and sleep, read a little, write a little, and lie back in a comfortable chair on the top of the boat, looking at the native craft and their life, the passing villages and the changing hills!

Following the great curves of the river, the original of the Kashmir shawl pattern, the distance to Islamabad or its port, Kanbal, is about 47 miles. The distinctive features of the scenery in this part of Kashmir are the *karewahs,* or alluvial plateaus. These are often continuous with the foothills, but are sometimes isolated, having low-lying ground all around. On the lower slopes are terraced rice-fields, with Indian corn growing higher up and wheat on the top.

MAN, WOMAN, OR CHILD TOWED THE HOUSE-BOAT

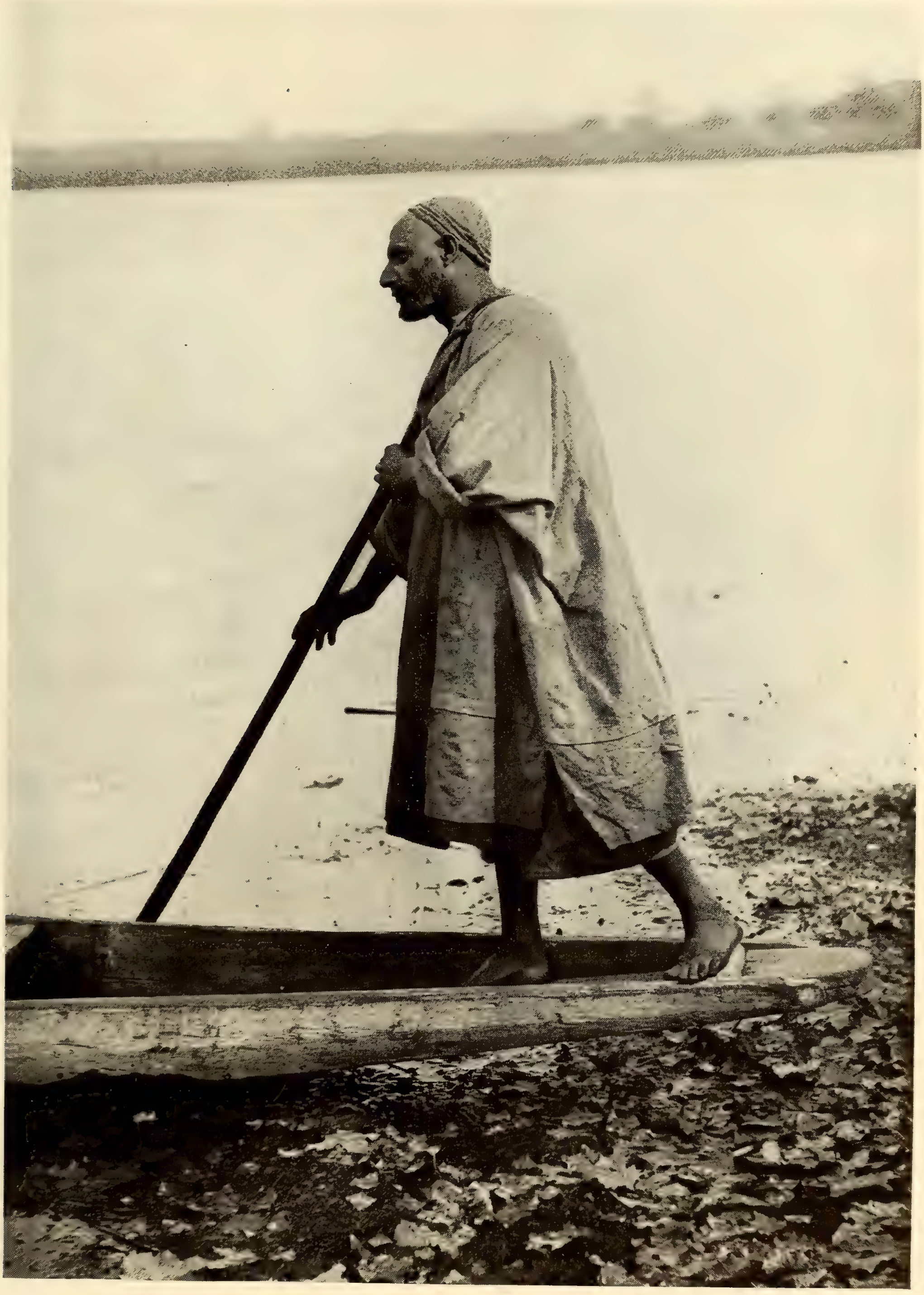
Life in a house-boat would soon become confined and tiresome, were it not for the frequent stops for food and water and in order to see interesting ruins along the way. Our cooking was done in a separate boat, supposed to be attached to the stern of the one we lived on, but more often it was far behind, sometimes in the dim distance, if the meals were not ready



Photograph from M. M. Shoemaker

THE SHAH HAMADAN MOSQUE, SRINAGAR'S PRINCIPAL MOSLEM SHRINE

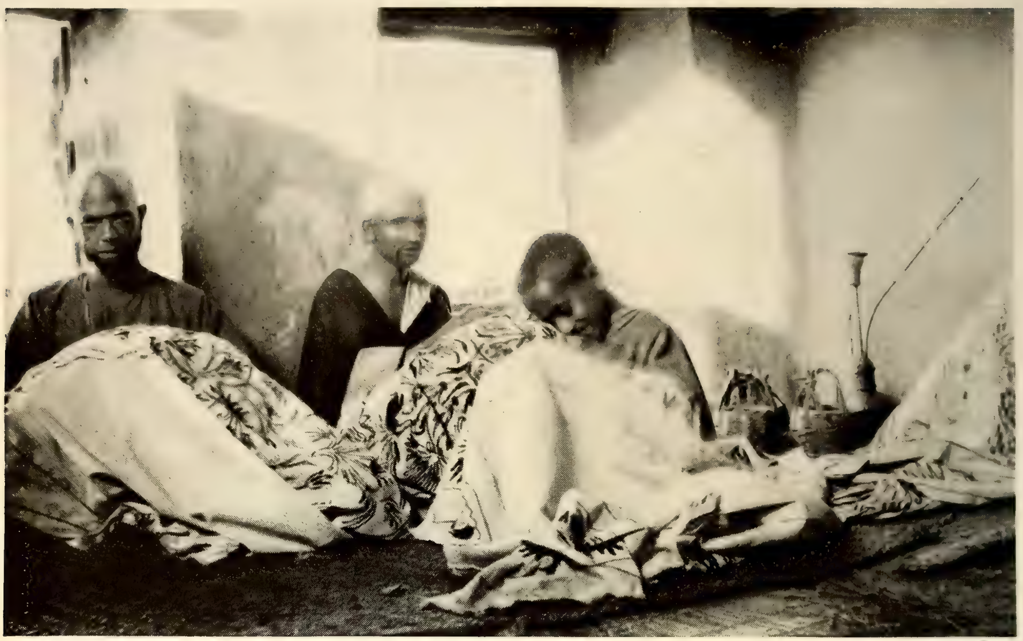
Constructed of beautifully carved deodar wood and containing a Hindu idol in a niche in its stone foundation, this spired *ziarat* of Kashmir little resembles the domed mosques of the Near East.



Photograph by Fred Bremner

A KASHMIR BOATMAN

The truth about Kashmir may be learned by combining the alluring accounts given by the poets with the scandalous tales of the boatmen. The *hanjis,* or boatmen, are almost amphibious; but, like Jack ashore, they lose something of their picturesqueness and distinctive character when they reach dry land.



Photograph by William Jessop

ADDING THE CHAIN-STITCH DECORATION TO WHITE FELT

Felt, used comparatively little in the West, was made long before spinning or weaving was invented. As skins marked the hunter period in history, so felt marked the pastoral period. These heavy Kashmir embroideries are used as rugs as well as curtains, and most of the sewing is done by men.

on time. We always had to tie up along the shore to have them served.

We stretched ourselves by walking along the path in front of the man, woman, or child who happened to be towing the boat. It is customary for the boatman's family to live in the cook-boat and to take turns in towing or poling.

Never shall I forget the wonderful sunset of that first evening out. It was the Sabbath, and it seemed to us, as we stood on the bank of the river, looking up and down and across to the mountains that shut us in, that an especial peace pervaded nature in the heart of this heathen land.

In the west, above the distant blue haze of the mountains, spread a fiery glow, which, as it extended upward, changed through all the shades of rose and pink to palest mauve at the zenith. In the east the moon shone full over the nearer hills, whose billowy tops caught wonderful opalescent tints and whose hollows were full of bluish shadows. Seen through a purplish haze which softened the whole, the picture was one which any impressionist would have given years of his life to reproduce.

At Bijbihara the two men left us to walk the last four miles to Kanbal, which they could do faster than the boat could go, to arrange for ponies for our trip through the mountains.

Unfortunately for us, our going was coincident with the return of people from the hill stations to Srinagar, and horses were very hard to get. After considerable trouble, eight pack ponies and three riding horses for the ladies were engaged, but the men had to trust to luck to get their own mounts at Eishmakam, our next stopping place, 16 miles away. So we slept the sleep of the just that night, the last to be spent in our home on the water for nearly a fortnight.

The next morning we were up early, sorting out what we wanted to take from the boat, and setting our belongings out on the river bank that all might be in plain sight and each pony have its proper load.

There were bedding rolls and suitcases and bags with personal belongings,

Photograph by William Jessop

A KASHMIR WOMAN POUNDING RICE

Throughout the East, wherever rice is eaten, one is never far from some type of mortar and pestle. These women wear the *pheran* of grayish wool (see text, page 531) and the boatman's daughter has added woolen pigtails to her own dark tresses.

two boxes of tinned stuff, three tents for ourselves and two for the servants, a leather-covered basket with enamel dishes, a collapsible table and two chairs, besides numerous small articles.

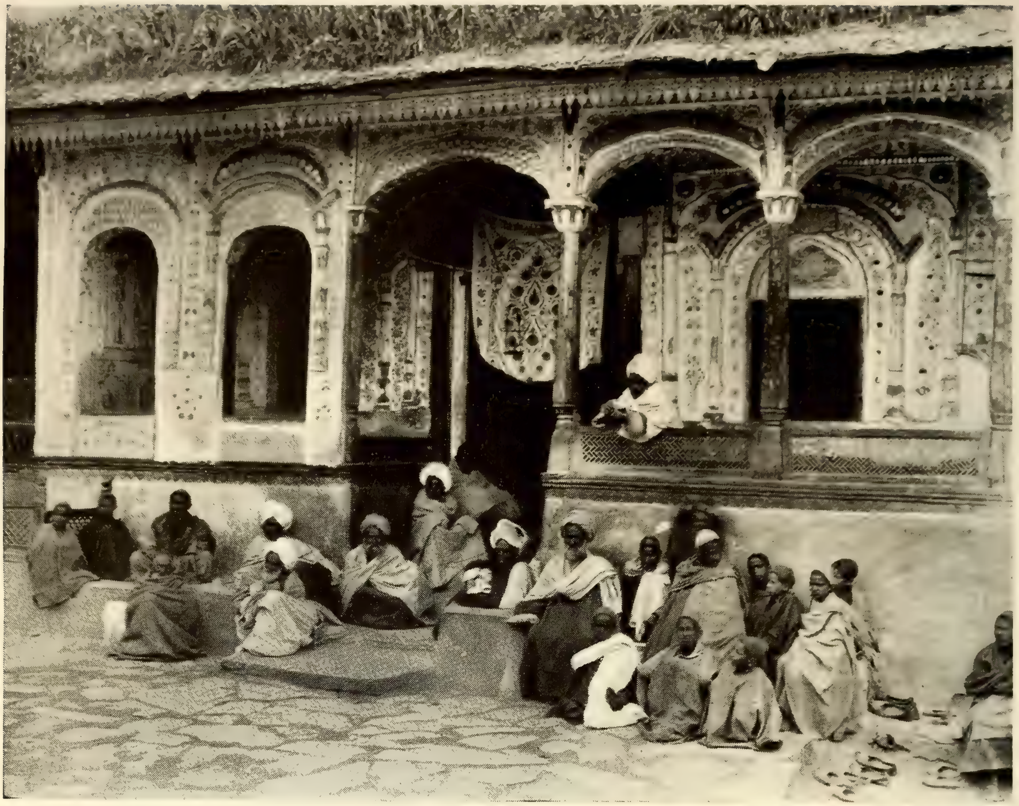
A NUMEROUS RETINUE

One coolie carried the cameras and another our tiffin basket. Everything else went on the ponies' backs, and a considerable amount of time and breath it took to adjust loads, for each *syce* (groom) tried to shift the undesirable portions to the other *syce's* pony. Besides, what did it matter to *them* when we started! Time is of no account in this country, as a guard once told me on one of the trains, and I am sure it isn't—to the native.

When preparations were under way we heard sounds of mourning from the region of the cook-boat, and upon investigation learned that one of the women was weeping and wailing because her husband had not been chosen to go on the trip. The Kashmiri is very emotional, and even men cry like children when disappointed or when they wish to arouse the sympathies of the hard-hearted foreigner.

At last our cavalcade was ready and we set our faces toward Amernath, the goal of our desire. The ladies led off on their ponies, each with a *syce* at its head. The men followed on foot with the camera and tiffin coolies, while behind, in Rahim's charge, came the eight pack ponies with their *syces,* our servant, the *bhisti* (water-carrier), and *mehtar* (chore boy), the lowest servant of all.

Westerners will wonder at the numbers required in a simple camping trip; but the East isn't the West. No man here will look after another's horse, nor will the *bhisti* do the *mehtar's* work, and the cook will do the work of neither. The sahib and mem-sahib lose caste and the respect of all classes if they do anything for themselves, and so it goes. Besides, the labor problem is not so serious when a riding pony, saddle, and *syce* cost only a rupee a day and a pack pony with his care-taker one-half as much.



Photograph by A. Hodgson

A MOHAMMEDAN SHRINE IN THE HINDU STYLE

The Moslems of Kashmir are said to be Hindus at heart and for them the abstract religion of the Prophet has little appeal. Their shrines are brightly decorated and contain much of the fine wood carving for which the artisans of northern India are famed.

Our way lay through Islamabad, up the side of a steep *karewah* to Martand, down again to Bawan, and on up the valley by a wide level cart-road, on either side of which were stretches of heavy-headed rice ready for the sickle, on to Eishmakam.

Islamabad is the second town in Kashmir, with 20,000 people. Quaint as it is, with its latticed windows and overhanging balconies, it especially interested us as the place where *gubbas* are manufactured. These are curtains embroidered chiefly in chain stitch, of various colored wools, on a red, green, or blue wool background, with a border of contrasting color. They sell in New York for $12.00; in Islamabad the same size and quality can be bought for $1.60.

Three miles from Islamabad, over the rice-covered top of a *karewah,* on the slope which joins it to the mountain behind, stands the temple of Martand, the finest and most picturesque ruin in Kashmir. It interested me personally more than Amernath, because of a beautiful description I had read, and I looked with longing eyes for the first glimpse of its gray walls in the distance.

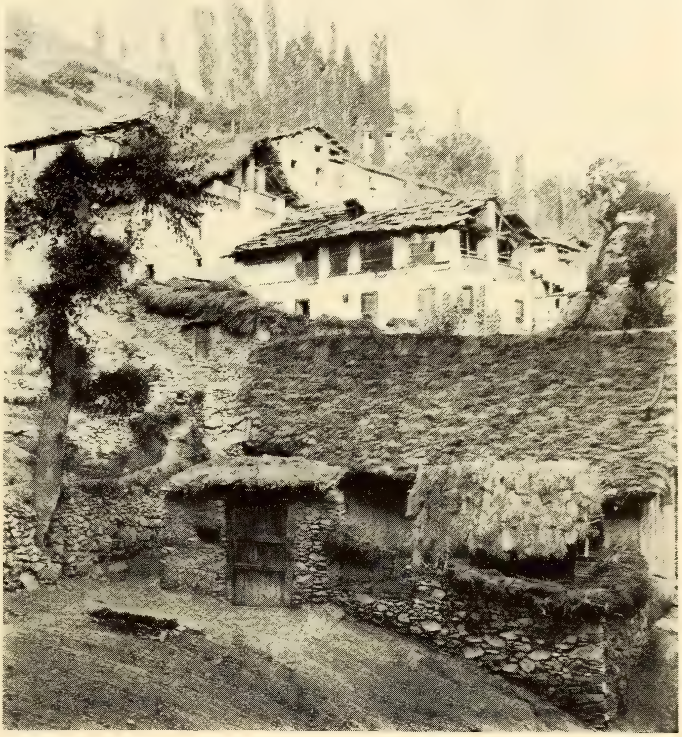
The temple proper is situated in the center of a quadrangle about 250 feet long and 150 feet wide, inclosed by a beautiful colonnade of pillared arches and fluted columns with Doric capitals, 84 in number. The northwest corner of this colonnade is now a mass of loose stones. The northeast corner is best preserved. The main gateway is on the west, but all that remains of it are two thick walls of stone from which the carving has been almost obliterated.

The temple originally included a central building consisting of two rooms joined by a thick arch, which have been likened roughly to nave, choir, and sanctuary of a cathedral, and two side chapels, one to the north and the other to the south. Of these latter only a small portion of two walls remains.

Steps on the west formerly led up to the entrance to the nave of the main temple, which was surmounted by a magnificent trefoil arch. The steps are now little more than a mound of earth. On the other sides of the temple are similar trefoil arches with huge closed doorways below.

The interior walls of the nave and choir are richly ornamented with carvings of gods, lotus flowers, and other designs. The pediment is considerably in evidence.

On the left wall of the nave, as you enter, are carvings of Kali, Brahma, and Vishnu; to the right, Suraj, Lakshmi, and Surati. A carved frieze probably three feet wide surrounds it. The inner room, or sanctuary, where the sacred lingam used to be, is quite bare. Water was originally brought from the hill at the back for the purposes of worship, and the drain which carried it off can still be seen on the outside.



Photograph by A. Hodgson

THE AGILE HOMES OF EISHMAKAM: KASHMIR

This picturesque village climbs the craggy slopes of a steep hill in a way that suggests nimble-footed inhabitants of the mountaineer type.

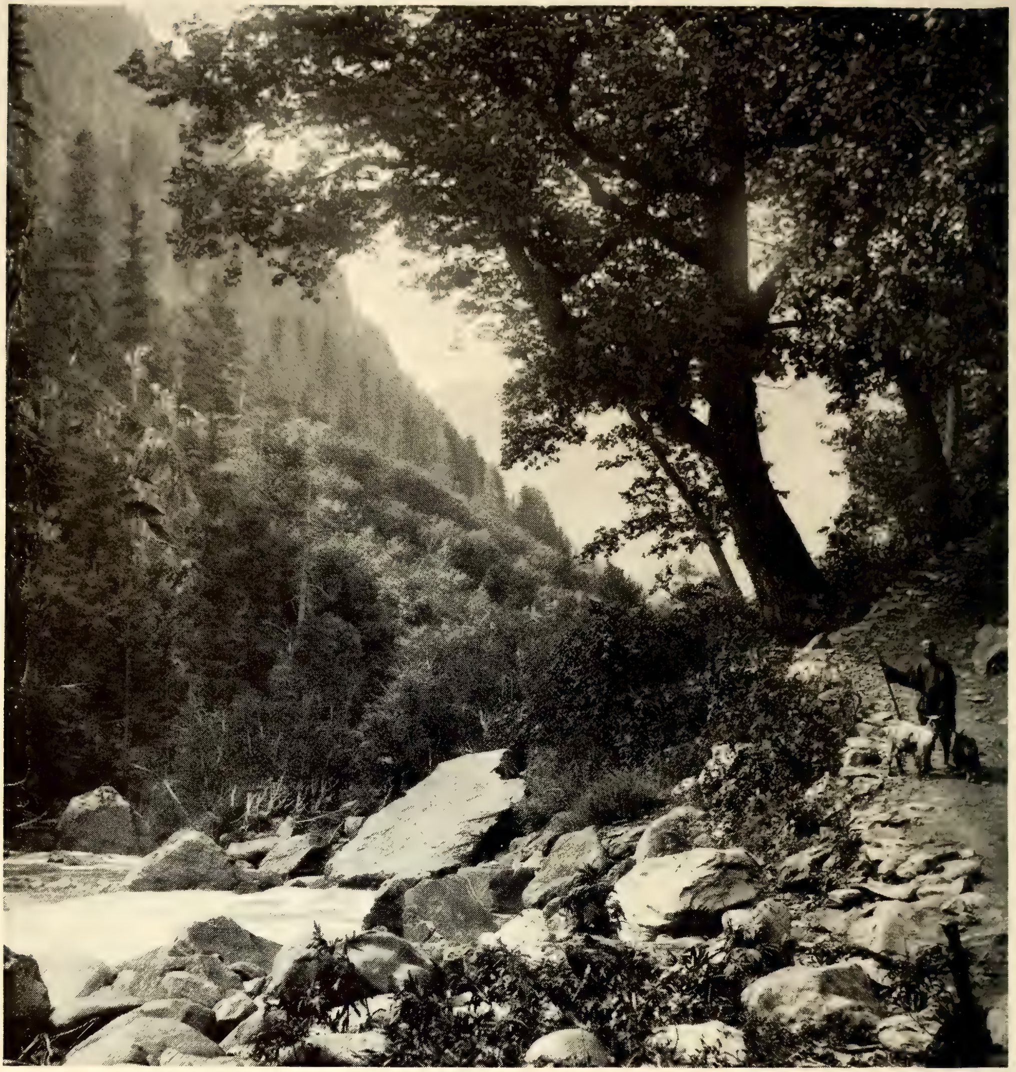
BUILT BY A RACE OF GIANTS, SAY THE KASHMIRIS

The gray walls rise 40 feet above the foundation and are open to the sky. It is believed that Martand in the beginning had a pyramidal roof, and that the whole was nearly double its present height. Some stones in the walls are from three to eight yards long, one to five wide, and one yard thick. Is it any wonder that the Kashmiris insist that a race of giants built this famous shrine; for they say, "How else could such huge blocks have been raised so high?"

How, when, by whom seem to be matters of conjecture. Some say, as early as 3000 B. C., Ramadeva founded a large city called Babul on the plateau of Martand, in which there were eleven lakhs of houses (a lakh is 100,000), and that he built a temple at this time.

The present structure is supposed to date from the first half of the fifth century A. D., while the cloisters were erected 300 years later. How, when, or by whom? What difference does it make, when one is under the spell of the beauty and majesty of this magnificent ruin? For the moment the present ceases to exist, and the mind wanders back to the dim ages of the past, when this plateau was the scene of a busy life and devotees crowded to the shrine to sprinkle water on the sacred symbol of Siva and crown it with a garland of flowers.

Today the temple stands like a lonely sentinel overlooking the silent fields—"a monument of Hindu taste in what it was



Photograph by Fred Bremner

IN THE HIMALAYAS

The Vale of Kashmir has long been praised; but more impressive than the elevated basin in the center of which lies Srinagar are the steep valleys which gash the mountain walls and lead the icy waters from the glacier fields on the roof of the world to the dusty plains of the thirsty Punjab.

and of Mohammedan iconoclasm in what it is." Only the natural beauty of the surroundings remains the same—the hill to the east rising behind, the valley smiling below, the range to the north with a wonderful mauve coloring, while the higher ones to the west and south are almost hidden by a blue haze.

And so I rode away slowly, reluctantly, trying with many a backward glance to impress this stately pile upon my mind, so that I might call up a perfect picture in later years, when the past means so much more than the future.

FISH TANKS SACRED TO VISHNU

At Bawan we had tiffin in a grove of splendid chenar trees and visited two tanks of crystal water sacred to Vishnu, in which fish are kept. The great interest of this spot is to feed these fish, and obliging natives provide material, expecting baksheesh in return. The fish come up in shoals when food is thrown in, and

Photograph by William Jessop

LEAVING THE BEATEN PATH AT PAHLGAM

Here the resolute traveler leaves the easy road and the lure of lazy contentment to climb the rugged path that leads to the cave of pilgrimage at Amernath, 24 miles away and nearly a mile higher up the mountain wall.

even a large *chapati* (a wafer made of dough and baked) is almost instantly consumed with a smacking noise, as if the feasters were calling for more.

We reached Eishmakam about 4 o'clock. Upon reaching camp, our first thought was always for tea, crackers and jam or cheese, and while we were thus refreshing ourselves the coolies put up the tents and laced the beds together. Sometimes this was a long and tedious process and required much urging and considerable sternness before it was accomplished.

THE PEASANT COSTUME OF KASHMIR

Our simple housekeeping duties, baths and changes of garments from the dusty ones of the day, usually occupied us until dinner was ready—any time from 7 to 9 o'clock. The *lumbardar* of the village always paid his respects as soon after our arrival as possible, bringing as a gift a small basket of apples or walnuts. For this he expected something in return—the everlasting baksheesh. We usually gave a rupee, for it was through him that we obtained milk, eggs, wood, and oil as we went along.

These village head men were usually elderly, of a patriarchal aspect, large and benevolent-looking, and dressed in the unattractive garb of the peasant, the principal garment being a kimono-like *pheran,* of grayish brown wool. Under this, in cold weather, is held the *kangri,* an earthenware pot about six inches in diameter, protected on the outside by wicker-work and containing live charcoal. It is the Kashmiri stove and means comparative comfort to the poor.

Baggy trousers of white cotton, cut off just below the knee, are a part of the costume, and pointed shoes. Puttees (a word which the Western world has borrowed from Hindustan) of narrow wool cloth, wrapped bandage-fashion from the ankle to the knee, are often worn. A white turban completes the whole.

The ordinary Kashmir villager is very dirty. His *pheran* is of cotton, his sandals of plaited rice straw, and his head covering is a greasy red or gray skullcap.

Photograph by A. Hodgson

THE PRECIPITOUS FACE OF MOUNT PISU

The Amernath pilgrim route leads to the summit in long zigzags and hairpin turns, but the widespread view from the top justifies the arduous climb along a rock-strewn path.

This same cap is worn by little girls, but after marriage a square of cloth is fastened on it and falls over the back of the head and shoulders, veil-fashion.

Men and women alike wear the *pheran*. There is a legend that one of the many conquerors of Kashmir, in order to break the spirit of the conquered, decreed that the men should thereafter dress in long gowns.

ONE MEMBER OF THE PARTY LEFT BEHIND

Perched on top of a steep hill above the village of Eishmakam is a monastery, whose rambling buildings, with stone foundations, sun-dried brick upper stories, and grass-and-iris covered roofs present a very picturesque appearance. This shrine was built in memory of Zain-ud-din, a disciple of the greatest of Kashmiri saints. We were told that when he felt his end approaching he sent all his disciples away and told them to build a tomb for him where his staff was found. It was discovered in the cave over which this memorial is built.

Our way from Eishmakam lay up the Liddar Valley, along a good cart-road and through a beautiful forest much of the way, to Pahlgam, our next stop. Here, at a height of 7,300 feet, many people from the Punjab and the lower valleys of Kashmir camp through the summer months. They were all gone when we arrived, and the little church and country store were closed for the season.

We pitched our tents about two miles above the native village, on a grassy level, with a mountain behind, a mountain in front, and the rushing river at our feet. After the sun set it was very cold and damp and we were glad to go to bed early. Here one of the ladies of our party remained with two servants for five days, while the four of us made the trip to Amernath and back.

When we left Pahlgam we departed from the beaten track. Through forests and over barren hills, we followed a mere trail, which was often only a sheep's path, not always too well defined.

The scenery above Pahlgam is beautiful beyond description. Our path on the right bank of the stream for a time wound around an almost bare hillside, which swept up in long stretches to a massive rock-crowned top. The left bank was dark with firs—tall and symmetrical, like the play-trees of our childhood's Noah's ark — while the river between the hills gleamed far below like a silver band. Sometimes the trail lay between huge boulders, which also blocked the bed of the river, and the water broke into masses of foam and spray as it dashed madly on its way.

A HORSE ESCAPES

While we were having tiffin at Tanin, 10,500 feet up, our *syces* took a siesta and allowed one of the riding ponies to wander off. The Kashmiri *syce* seems fond of his horse, although he is lazy and will take a chance on getting through somehow without unduly exerting himself. Because of failure to hobble the horses at Eishmakam, one of our pack ponies wandered off and we never found him. For a bad half hour we feared the same thing had happened here, which would mean that the men must take turns on foot for five days. Fortunately, the animal was found and we proceeded on our way.

Just after leaving Tanin the river cuts through what looks like a bridge of marble, and I exclaimed at the wonder of it. Huge symmetrical blocks were lying at one side, as if carefully quarried for some splendid building. It was difficult to believe that it was a snow-bridge.

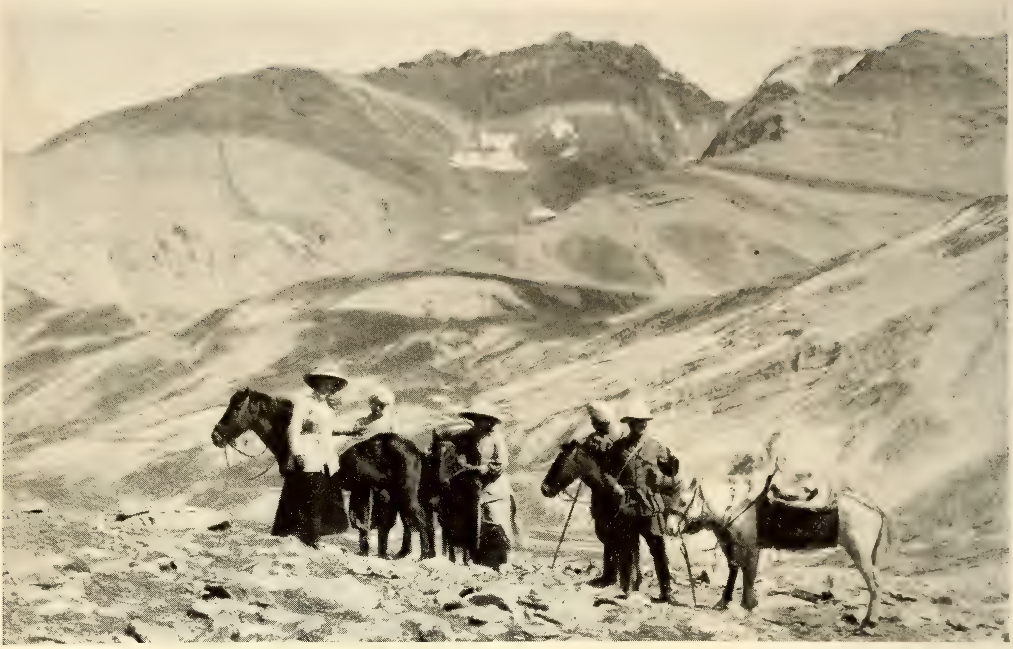
From here our path wound up, in zigzag after zigzag, the almost perpendicular side of a mountain which rises 1,500 feet above the river. Progress was slow for the poor pack ponies and scarcely faster for us.

The men walked much of the way to the top, and every now and then we rested our ponies by changing to theirs. The change was not a particularly comfortable one, for we ladies had English saddles and the men Kashmiri ones. The latter are made of wood covered with leather, curved very high at the back and front, somewhat after the fashion of

Photograph by A. Hodgson

TIMBER-LINE ON THE AMERNATH TRAIL

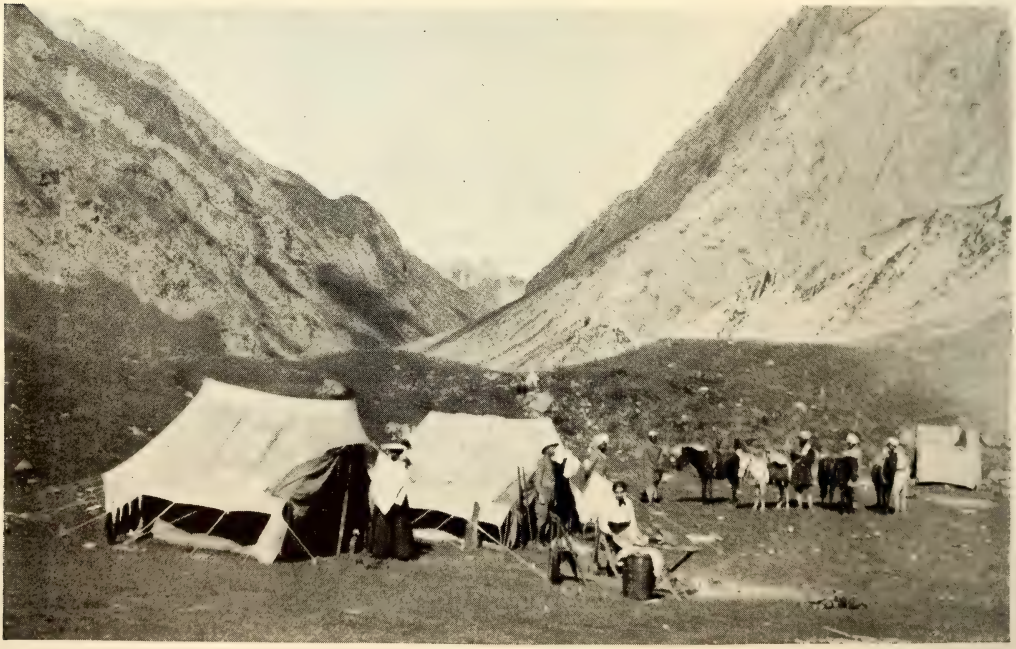
The valuable deodar extends from 5,000 to 9,000 feet above sea-level. The blue pine occurs at 6,000 feet and reaches to 10,000 feet. Above this height the silver fir is found, but above 11,000 feet only dwarf rhododendrons and junipers are to be seen.



Photograph by A. Hodgson

CROSSING A 15,000-FOOT PASS IN THE HIMALAYAS

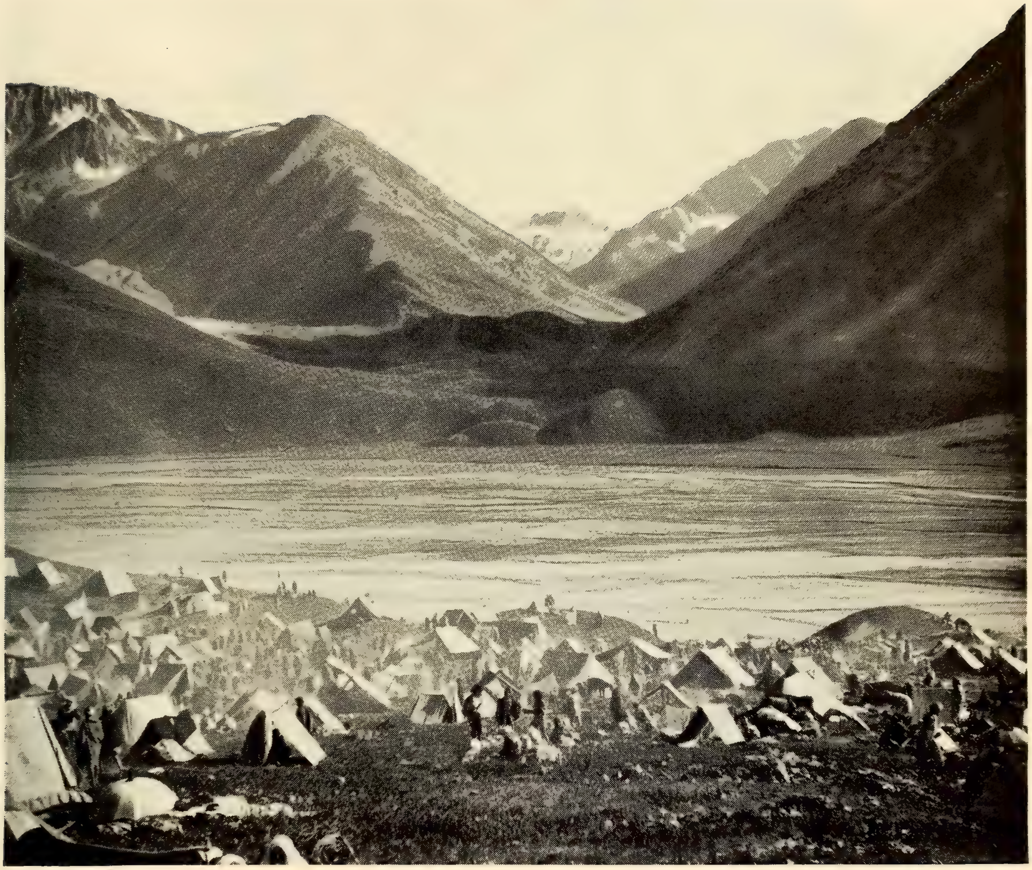
Here is little to suggest the loveliness of the vale of roses, dotted with peaceful lakes and hiding quiet gardens where fountains softly play. From this vantage point six snow-capped peaks can be seen. One of the ladies of the party had remained in camp at a lower elevation, being unable to undergo the hardships at three miles above sea-level.



Photograph from William Jessop

IN CAMP AT PUNJITARNI; ELEVATION, 13,000 FEET

Here the travelers found a great luxury in the form of firewood, which the Maharajah of Kashmir has sent up from the valley each year since he made his own pilgrimage to Amernath.



Photograph from William Jessop

THE PILGRIM CAMP AT PUNJITARNI

Situated at the edge of a wide plain, the pilgrims' camp below the sacred cave is, throughout the brief summer, a scene of bustle and life. Wood for fuel, from the Maharajah's supply, is bought by the pound.

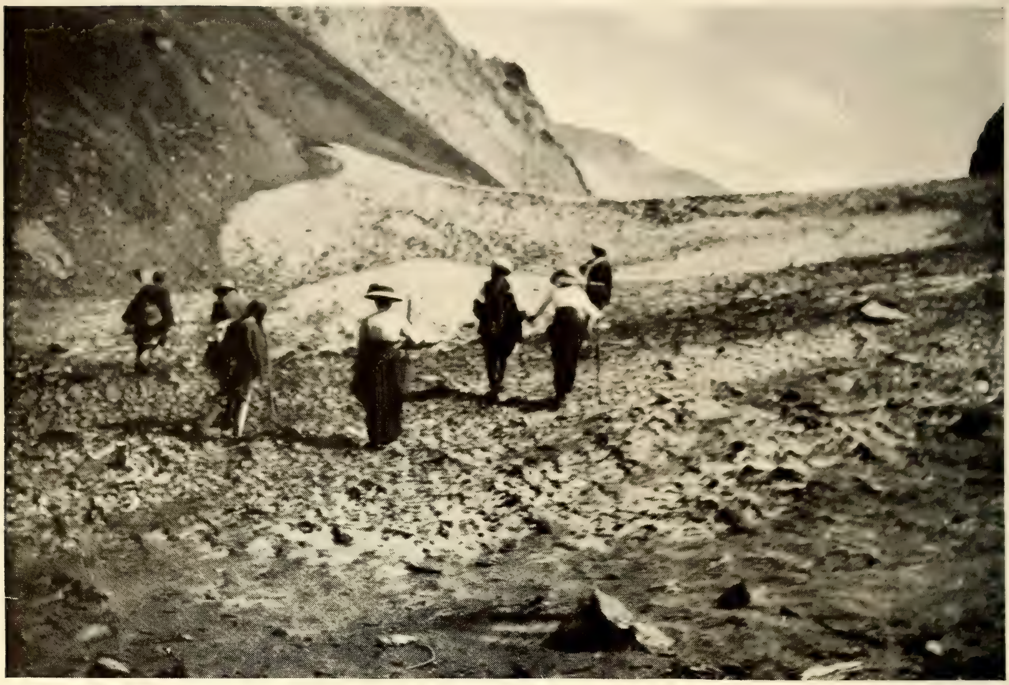
those used by the Western cowboy. The feeling is of being on a rocking-horse, and later in the journey, in making a sharp descent, I held on for my life, in deadly fear of pitching over the horse's head.

A PIGEON SHOT FOR THE CAMP LARDER

The path from the top of Pisu (the hill we had just climbed) wound round a steep, grassy slope and overlooked a canyon more than a thousand feet deep, at the bottom of which we could see the river, like a tiny thread, dividing the hills. Along the way grew wild strawberry vines, buttercups, snapdragons, and purple thistle with big fluffy tops. Every now and then several snowy peaks appeared over the hills across the river.

Now, in our party was a Nimrod, enthusiastic if not mighty, and the coolies took a great interest in his gun. They came to him in great excitement this day over some game they thought they saw. Our sportsman was lured to the edge of the cliff to shoot a poor, lone pigeon, which the coolies clambered down to get. We divided it among the four of us next day for tiffin—a choice morsel if not very satisfying. It was the hunter's only bag, except a chicken which strayed from us at Pahlgam and which was hit right in the neck. How many other parts were hit first was always a tender subject, for every piece of that unlucky fowl seemed to be peppered with shot.

Zojpal, our next camping place, 11,300 feet up, is a grassy meadow by the side



Photograph by William Jessop

MORE LIKE "GREENLAND'S ICY MOUNTAINS" THAN "INDIA'S CORAL STRAND"

The last three miles to Amernath must be traveled on foot, and the succession of snow banks and sharp rocks is fatal to leather shoes; yet many pilgrims make this climb on foot.

of the river. How gloriously the rays of the setting sun lighted up the snows of the encircling peaks and the few clouds which floated above, changing them from a brilliant gold to rose, and then to the pinkish mauve which is so often seen in the Kashmir sky and rock tints.

Along our pilgrimage we passed a big herd of cattle and many flocks of sheep. One shepherd was holding a four-day-old lamb in his arms, and immediately the beautiful simile in Isaiah of God's care for his people came to my mind: "He shall feed his flock like a shepherd: he shall gather the lambs with his arm, and carry them in his bosom."

SHEPHERDS BRING THEIR FLOCKS TO THE HEIGHTS IN SPRING

Perched high up on the slopes of the hills, all over the country, one sees rude huts made of boughs. They belong to the Gujars who, in the spring, bring their flocks through the passes from British India, and hillside after hillside is covered with their sheep, goats, cattle, and buffalo, as well as with those of the regular Kashmiri shepherds.

It is the presence of these herds-people that makes the water of the mountain streams in Kashmir so unsafe to drink, for their habits are filthy and the reek of the ground may sometimes be recognized at a distance of half a mile. Some flocks number over a thousand. We saw only a few, our visit being too late for much grazing, as it was also for most of the beautiful flowers for which Kashmir is famous.

Zojpal was very cold and we had a roaring fire, before which our rickety dinner table was set. Soon a hot meal was served, and we gathered around to do justice to Rahim's dinner. From somewhere he always produced milk and eggs and often chickens. We carried with us tinned stuff—pork and beans, tongue, fish, vegetables, etc. This evening he had bought or stolen a lamb; I don't know which. His story to us seemed straight, and we paid him Rs. 2-8-0 (80 cents) for it and enjoyed the tidbits, while from the coarser parts the servants had a curry feast.

The following morning at 9 o'clock we were on our way again—the final lap, as

Photograph by A. Hodgson

THE NARROW DEFILE THAT LEADS TO THE SIND VALLEY

Although summer has gone, snow-fields still cling to the precipitous slopes and barefoot pilgrims find the path a severe test of their faith.

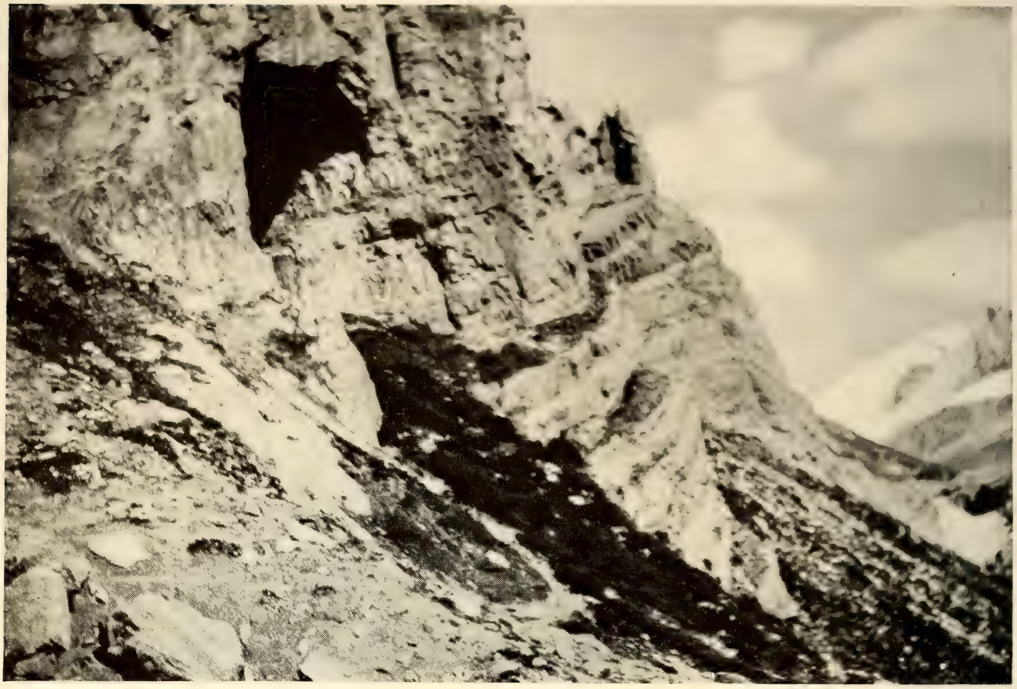
it were, for the next camping place would be our last before reaching Amernath. Another frightfully steep hill had to be climbed, over such a mass of rocks and loose stones that for some distance the path was quite undefined. A stream trickled and then tumbled down the height. Our path zigzagged up almost perpendicularly, wound over another spur, and then round and round a barren rocky hilltop, covered in spots with juniper. We were above the tree-line now, and continued so for two and a half days.

To our right rushed the river, in a succession of rapids, and farther along we saw two tiny lakes, the upper emptying into the lower. Above both lay Lake Shisha Nag, a beautiful sheet of water about one-third of a mile in diameter. The color is of a dark green with a peculiar bluish tinge, sometimes seen in glacier-fed pools of great depth. The water sparkled like diamonds in the sunlight.

Shisha Nag is surrounded on three sides by an amphitheater of limestone rock seamed by watercourses and rising almost sheer from the surface of the lake. When we saw it the tops of three of the peaks were covered with snow. Earlier in the season the snow extends down the steep slopes and ends in ice cliffs, which break off and float on the water like miniature icebergs. The lake is covered with ice until June.

The climb from Shisha Nag was over a snow-bridge through a sort of meadow, where there were remains of fireplaces and trenches for tents—no doubt a pilgrim camp. It was inclosed by an amphitheater of mountains.

On our right the long moraine slopes were capped by horizontal strata of solid rocks, from which jagged minaret-like



Photograph from William Jessop

AMERNATH CAVE AS SEEN FROM THE CREST OF THE SNOW-FIELDS

The steep ascent to the cave's mouth can be plainly seen. To foreigners this final climb in the rarefied air is a proof of pluck. To the pilgrims the heart-breaking scramble is the prelude to a spiritual enthusiasm born of two ice mounds hidden in a dark cave.

peaks jutted up into the sky. To the left of the defile we followed little more than a sheep's path trodden over the steep side of a mountain, while between, at a giddy depth, the stream cut through rocks in a series of beautiful waterfalls.

On up we went, through another meadow inclosed by towering domes and minarets of solid rock, past the source of our mountain river, and finally emerged on the top of Punjitarni Pass, 14,000 feet above sea-level. Here we picked eidelweiss and had a nice tiffin of canned tongue, hard-boiled eggs, tea from a thermos flask, and our precious pigeon.

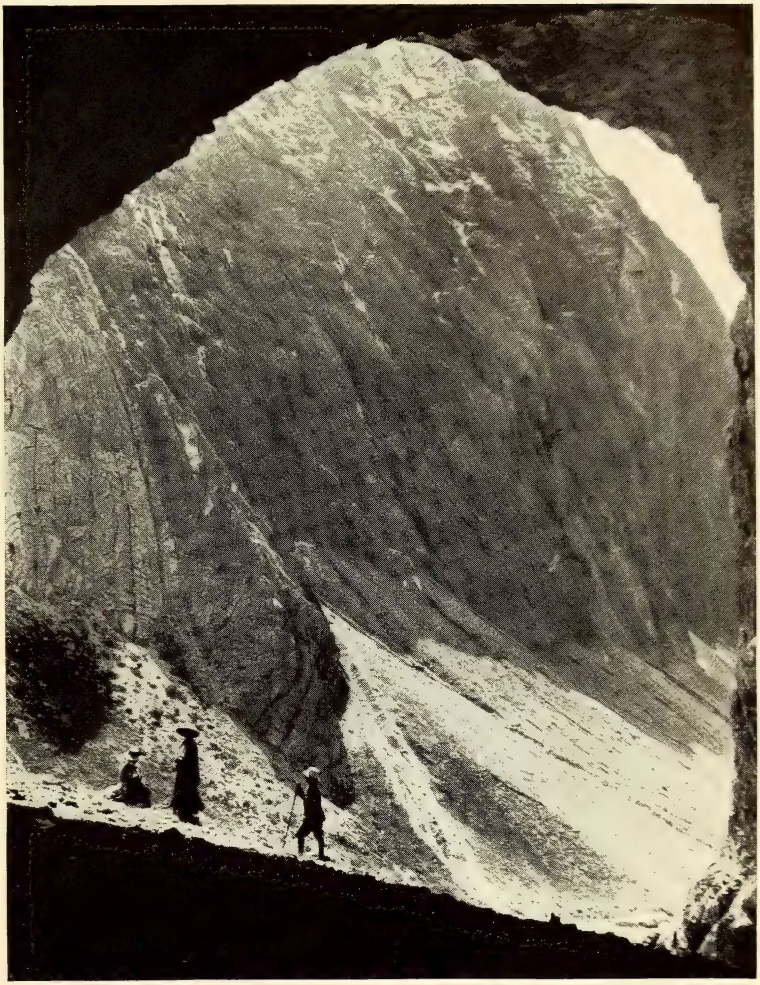
How good it all tasted and how refreshing! But who could linger long over a mere meal, with the everlasting hills in every direction? Looking back down the ascent that we had just made, outlined sharply against the sky, we could see eight peaks, six of which were snow-capped.

From the top of the watershed, looking forward over the way we had yet to travel, the Amernath Mountain rose ahead of us in barren grandeur. Two of the three rock peaks were covered with snow. To the right of us we had again the long moraine slopes crowned with horizontal rock strata, the top ones bulged in a curious way, as though pushed out by some disturbing force before they were quite cool.

To the left were the head-waters of the Sind River, and beyond them rose mountains in rounded domes, where earth and rock of softest reds, browns, and grays blended into an exquisite coloring impossible to describe. The path, for some distance scarcely distinguishable, led down a grassy slope, past patches of snow, said by our guide to be the remains of a storm of the week previous, over the stream several times, and up, down, and around the grassy hill.

Sometimes we looked down a precipice to the torrent below; at others we simply crossed the hillside.

Just before reaching Punjitarni, there is a steep descent, at the right of which is a big rock with loose stones on the top and piled high on the sides. It is a place of worship for the pilgrims. Beyond this we crossed a river bed, at this season of the year mostly sand and stones, but earlier, when the snows are melting, full of water.



Photograph by William Jessop

LOOKING OUT FROM THE MOUTH OF AMERNATH CAVE

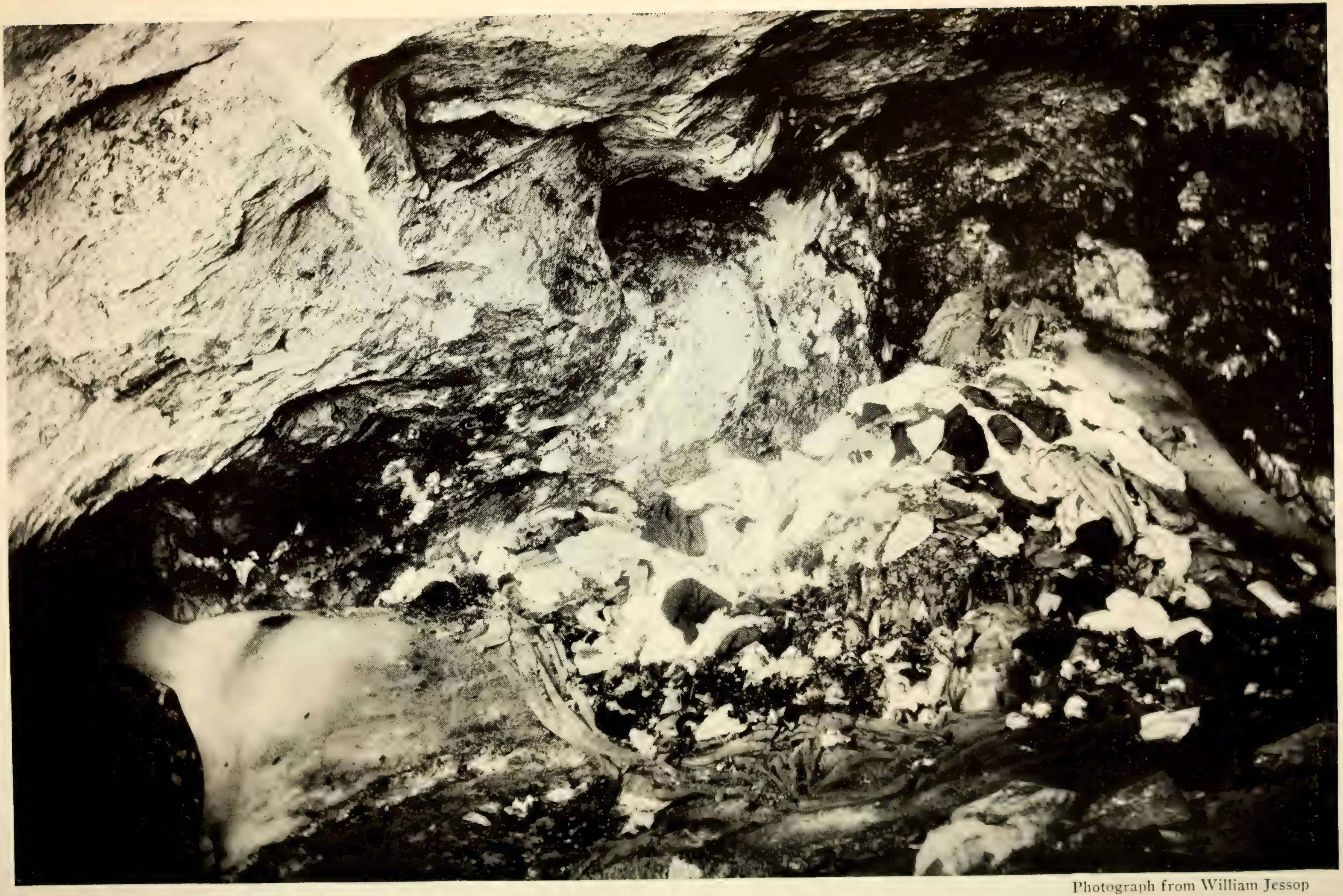
The goal has been reached, the holy scene made real to those who have long dreamed of the pilgrimage. Now comes the backward look to the arduous trail whose conquest has been completed. The swiftly beating heart is moved by a spirit of glad triumph.

On the far bank, in a meadow, at 13,000 feet, we pitched our tents. Being above the tree-line, with nothing but juniper, which is scarce, we might have fared badly had we not found some wood left by pilgrims. It seems that in the last two or three years, since the Maharajah of Kashmir made the pilgrimage, he has sent to Punjitarni each year a supply of fuel which the pilgrims can buy. They had left rude scales, made of the branches of a tree, by which the wood could be measured. It was probably sold by the half or quarter maund (80 pounds) and perhaps by the seer (2 pounds), for Indians can do more cooking with a few light twigs than any other people I have ever seen.

Neither we nor our servants practiced any such economy, for on each of the two nights we spent at this place we had a roaring fire, and so did our followers. What glorious blazes they were! Such a comfort and such a pleasure, and how loath we were to leave them for our chilly beds!

It was cold on the first of October, and even with all we could pile on in the way of underclothing, blankets, and eiderdowns, we were not thoroughly warm at night. Not much wonder that such was the case, with only a camp cot in a tent set on the grass. Each morning there was a white frost over everything. As soon as the sun rose, however, every one thawed out and was happy.

The first morning we were awakened by the sound of great lamentation—a coolie, lifting up his voice in loud wailing, as they do in the East in case of mourning. We could think of nothing dire enough to cause such audible sorrow except the death of a man, and I must confess to a fearful sinking of the heart.



Photograph from William Jessop

INSIDE THE SACRED CAVE OF AMERNATH

In this rocky recess the devout pilgrims strip off their clothes and throw themselves naked on the blocks of ice which here form lingams, phallic emblems symbolic of Siva, the re-creator. The ice mound to the right is covered with the clothing of the pilgrims.

Great was our relief to learn that it was only a pack pony that had died.

No doubt the owner felt badly enough, as it was half his living, and we were sorry for his loss; but our sympathy would have been greater had he treated the animal with more care. The second day out from Pahlgam on this trip we learned to our dismay that no food had been brought for the horses, although money was given for the purpose before we left.

The *syces* were even too lazy much of the time to lead the animals to water before we started in the mornings, trusting to luck that we would let them drink at the first running stream. They rarely troubled to relieve the animals of their saddles after a hard day's journey, until they were made to do so, sometimes by no gentle means. So long has the Kashmiri been accustomed to rough treatment that he pays little attention to a quiet command, if it happens to be contrary to his own desires.

How those ponies ever lived for four days on the short grass, most of it dry at that time of year, will always be a mystery.

At Tanin, on the way back, the first point from which a bazaar was accessible, the servants were told that they could have no food until some had been bought for the horses, and that they should be fed in our presence. Knowing that we were very angry and fearing that their baksheesh might be lessened, they walked two extra miles and brought back in triumph a bag of ground grain. This was mixed with water and roiled into cakes.

Never shall I forget the sight that followed. The ponies were lined up on the grass in the light of our camp fire, with the portion of food for each in front of it, and we stood guard until the last morsel had disappeared, thus satisfying ourselves that the starved little beasts had had one proper meal, and that it had not been stolen by their keepers.

After the trip was over, the man who lost his pony was paid for it. We remembered what Westerners are too prone to forget, that these Eastern servants are just grown-up children, with about the same amount of judgment and foresight. We dared give no intimation beforehand of our intentions, however, or more casualties among the pack animals would have followed.

In a roundabout way we learned from the head *syce* that a good pack pony was worth about four sheep; but he added scornfully, "This one was old and ready to die; two sheep would buy it."

As we had paid Rs. 2-8-0 for a sheep, we decided Rs. 5/- would be sufficient compensation. Judging from the smiles of pleasure with which this sum (equivalent to $1.60) was received, our valuation was correct. At any rate, the bereaved owner went away satisfied, which is rare with that class in India.

THE LAST FIVE MILES TO AMERNATH

From Punjitarni to Amernath is five miles, the last three of which must be traveled on foot. For the first two miles the path winds around the hillside, beside the stream we had crossed to reach our camp.

As we looked up we could see a number of snow-bridges, and our way led past the spot where one had been carried away. The wall to our right still remained intact, a perpendicular surface, like purest marble, 30 feet high. Blue flowers very like our hepaticas grew here and there along the roadside.

Presently the path became too steep for our ponies, and we left them on the lower slope of the hill, to be happy with what grass they could find, until our return.

Now it was our turn to work, for our winding path could be traced up the almost perpendicular side of this spur, more than 500 feet to the top.

I had to take the climb in short stages, with many rests, on account of the fearful pumping of my heart. To none of the party was it play, at 13,000 feet. From the top, looking back, was a magnificent pile of mountains, the central one a sharp ridge, descending at each side in long, bare, rocky slopes, while to the left and right rose snow-capped peaks.

The path followed the hill to the right for some time, then that to the left across snow-fields, over loose stones, among which the trail was almost lost, and finally up the last steep ascent over rock masses to the entrance of the cave

The snow-fields interested us greatly They were masses of snow, drifted in from the winter storms, over the streams.

The melting snow from the hillsides and spring rains carried earth and stones on to them, and alternate thawing and freezing made solid fields, often many feet in thickness. The largest in this defile was about a half mile in length and 80 feet across at its widest, and was a succession of hills and hollows.

It was from the top of this immense bridge that we had our first glimpse of the famous cave—an opening 150 feet long, wide and deep, in a huge mass of gypsum rock. Extending from the snows on the right down past our field to the other end of this defile rose a rock-crowned hill, with its long moraine sides, and on the left a hill just as high, capped with jagged gray rock minarets, seamed and scarred, jutted up against the blue of the sky.

In the crevices snow had resisted the summer suns and was still lying, giving a peculiar streaked appearance to the rocks, visible many miles away.

Near the cave a cold, crystal stream tumbled down the mountain side in a series of beautiful cascades. From it we took our only drink of unboiled water in Kashmir, for no shepherd could perch his filthy hut on these steep slopes.

To complete the picture, we should have seen the pilgrims hurry along the valley toward their Mecca, sometimes as many as six or seven thousand of them. When they reach the last steep ascent, the most zealous of the men and women cast off their clothing, and, clad only in a scant attire of birch bark, toil up the hardest part of the slope, chanting as they go.

We were too late, however, for this pilgrimage, which occurs at the full moon of the month of Sawan, in our July or August. Hindus come from all parts of India, some barefoot and only half clad, and if snow falls, as is sometimes the case, or the weather is inclement, many die on the way. In 1900 and 1901 cholera followed their visit and ravaged the Happy Valley in a most cruel manner.

The interior of the cave is very disappointing. At the back of it are some springs, whose issue forms a dome-shaped block of ice somewhat like the lingam or symbol of Siva. This ice is clear as crystal. At certain seasons it is about two feet high and covers an area of three or four square yards. When we were there the block was much smaller and the lingam quite indistinct. Siva is supposed to enter this symbol in some miraculous way; hence the adoration lavished upon it.

A few flowers still remained on and around the ice, and we found a number of *buttis* (small clay lamps) lying on the floor of the cave—sole remains of the worshipful throng that had been there but six weeks before.

THE MEANING OF AMERNATH CAVE TO THE HINDU

At the earnest request of one of his clerks, a member of our party laid a garland of flowers on the icy symbol of the "great destroyer," most popular of the Hindu trinity—Brahma, Vishnu, and Siva. The full merit to be acquired by taking the trip was out of his power, but he thus made his offering by proxy at this very sacred shrine, and so lay up what righteousness he could.

We had not realized what a visit to this cave means to a Hindu. The Christian has his Jerusalem, but he goes there as to a historical city. One sacred spot after another is viewed with feelings of indescribable interest and awe, and a holy calm comes over him as he realizes that, in some instances at least, he is actually treading the path that his Master trod. That is all.

But to the Hindu pilgrim, Amernath was the first abode of his god Siva, the destroyer who ushers in another life, and the word means life that never ends; so that the devotee who enters the inclosure treads upon holy ground and receives the gift of everlasting life—a goal before which all toil, all hardship, even the death of the body, sinks into insignificance.

Notice of changes of address of your GEOGRAPHIC MAGAZINE *should be received in the office of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your January number, the Society should be notified of your new address not later than December first.*

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THE ISLANDS OF THE PACIFIC*

By J. P. Thomson, C. B. E., LL. D.

Honorary Secretary and Treasurer, Royal Geographical Society of Australasia

WHAT memories of the past the place-names of the coral-girt islands of the South Pacific Ocean revive! They bring to the reflective mind the romantic side of life; they recall the daring exploits of adventuresome enterprise on the part of those early navigators whose romantic career has fired many a youthful breast with hopeful enthusiasm; they remind us of the illuminating pen sketches by Robert Louis Stevenson; they bring to our thoughts stories of thrilling achievements in the piratical operations of that one-time buccaneer, Captain Bully Hayes.

They bring us face to face with primitive life in all its varied phases, ranging from the nomadic peregrinations of the native trader to the precarious existence of the beach-comber; from the reef harvesters to the tribal councilors, and from the wild head-hunters to the bush cannibals; from the excited warriors, in all their fantastic accouterments, to the primitive village maiden, bedecked in garlands of wild flowers and habited in the simplest form of grass skirt; from the elaborate local native court (Bose Levu), at which the great district chieftains are represented, to the all-embracing provincial parliament of the people (Bose vaka Turanga), where the ruling personages assemble.

Among these islands have occurred some of the most wonderful manifestations of the stupendous forces of nature ever witnessed by the eye of man, in the modification, alteration, and creation of land forms and in local disturbances of vast magnitude, through violent earthquakes or eruptive phenomena. Here, too, have occurred wide devastations and great destruction to property following the wake of periodical hurricanes along the equatorial belt.

These facts and many others come crowding to the mind when speaking of Polynesia, the South Sea Islands or their synonyms. While there is certainly no place on earth more beautiful, more enchanting, or more seductive to the island-dweller, there are few places where the forces of nature are more active, more varied, more constructive, or even more devastating.

THE MARVEL OF THE CORAL REEF

Take, for example, the coral reef phenomenon by which islands are formed and connections established on a vast scale between widely separated areas, extending over thousands of miles of ocean. Also be it remembered that these immense submarine and subaërial coral masses, on which the very existence and stability of most of the Polynesian islands seem to depend, are the product of one of those low forms of animal life that enter so largely into the economy of nature and make us feel that the combined efforts of men are comparatively feeble and ineffective.

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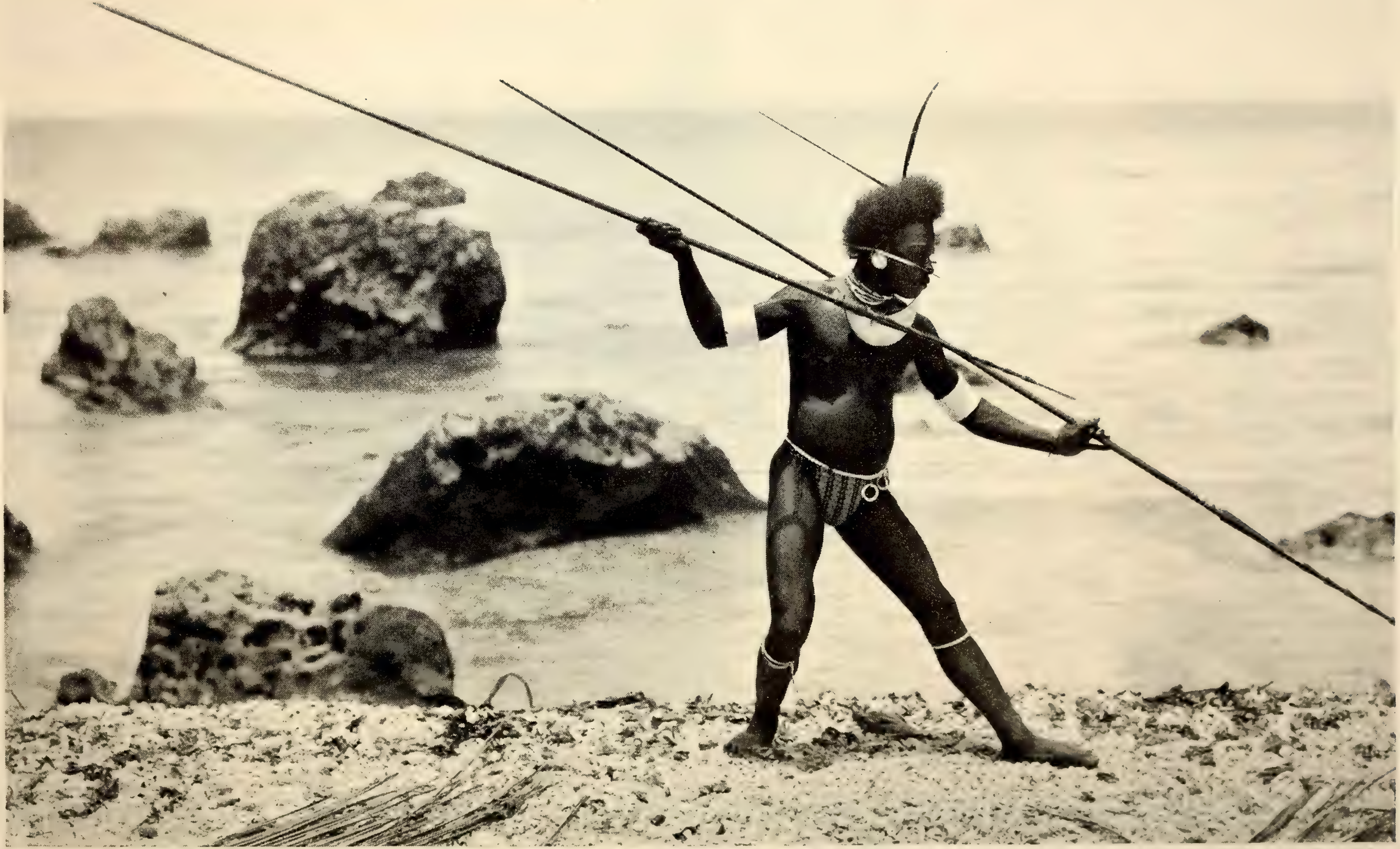
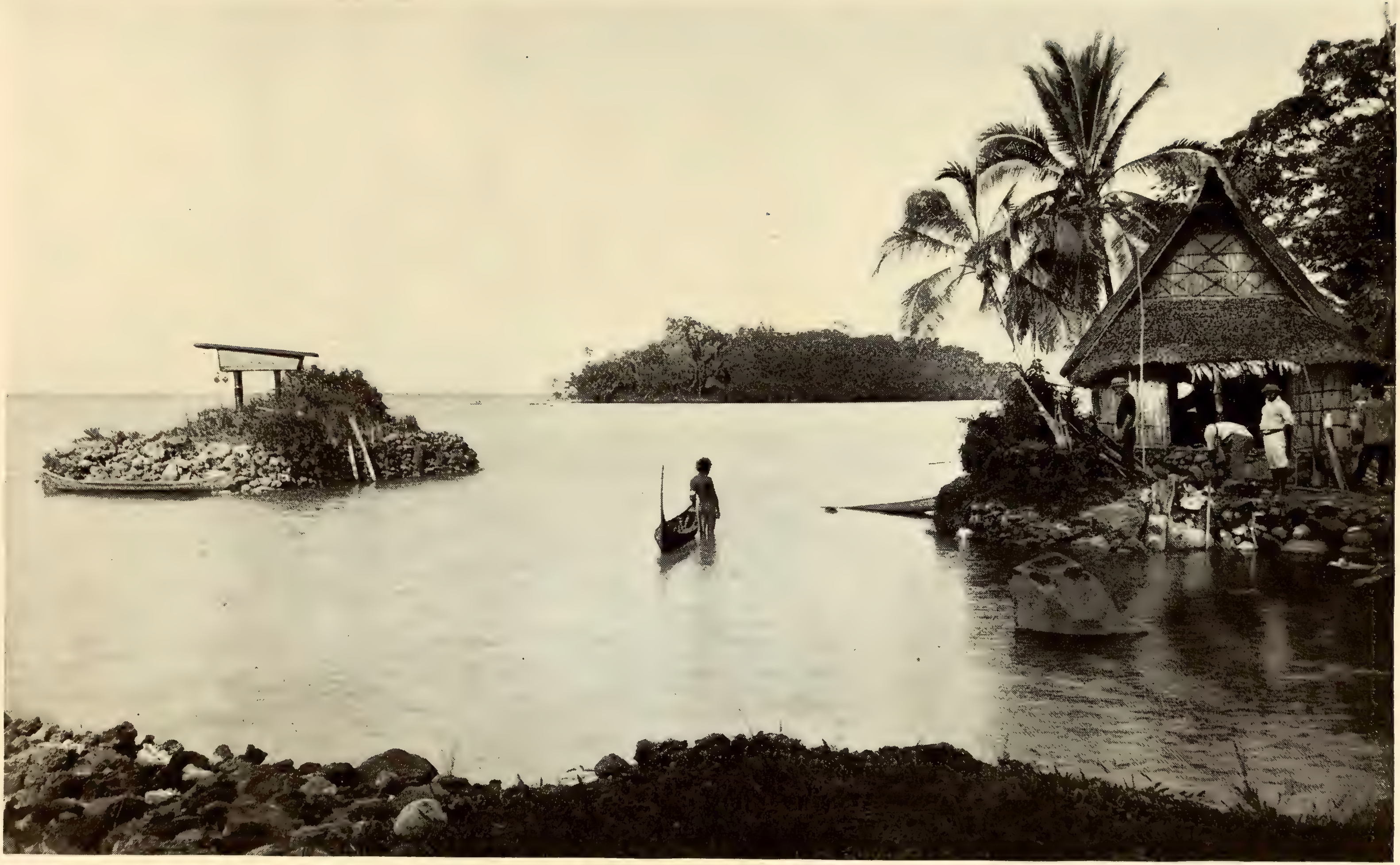
* See Map of the Islands of the Pacific issued as a supplement with this number of THE GEOGRAPHIC.



Photograph by J. W. Beattie

A FIGHTING MAN OF AHIA, IN THE SOLOMON GROUP

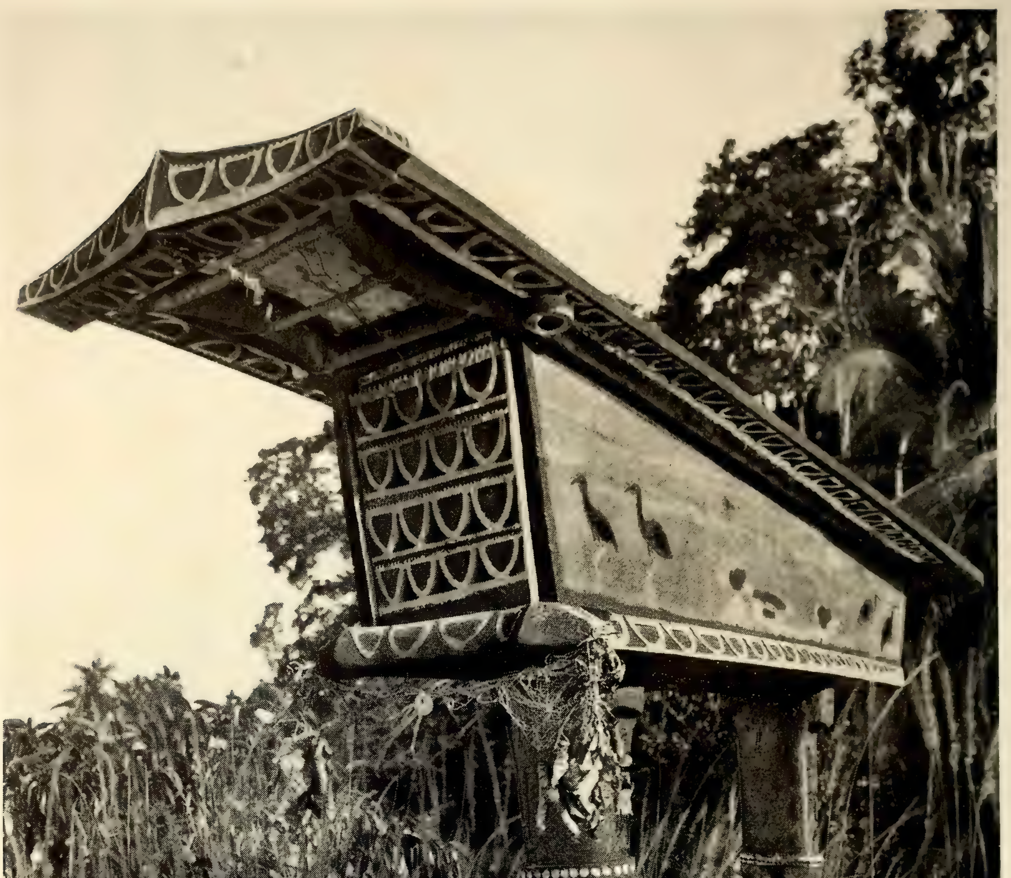
It is not customary for the men of the Solomons to carry arms within their own villages, but they take this precautionary measure when wandering in forest or along shore. The favorite weapon is either a spear or an adze.



Photograph by J. W. Beattie

MENDAÑA, THE 16TH CENTURY SPANISH NAVIGATOR, CALLED THESE "THE ISLANDS OF SOLOMON" IN ANTICIPATION OF THEIR NATURAL RICHES

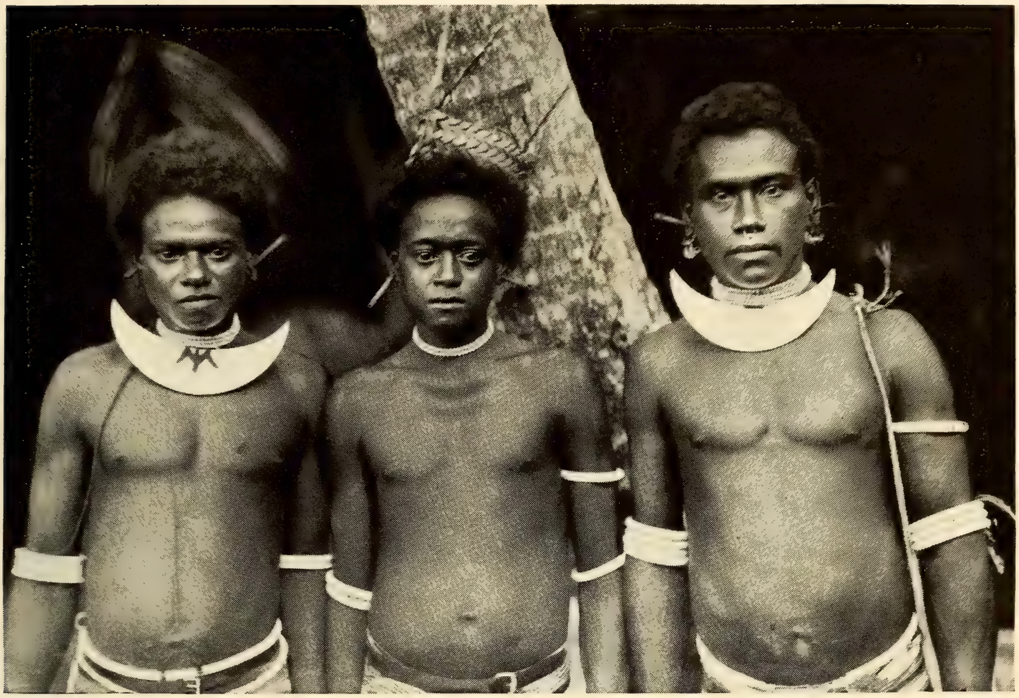
To the left may be seen an islet with a shrine to a dead chieftain (see also illustration on page 546).



Photograph by J. W. Beattie

THE SOLOMON ISLANDS METHOD OF "LAYING A GHOST"

The natives fear ghosts. If a chief has been powerful in life, it is believed his ghost will be powerful after his death. A shrine is made containing relics—the skull of the chief or his cremated body—and gifts of food are placed on near-by stones. It is taboo to pass behind the shrine.



Photograph by J. W. Beattie

SOLOMON ISLANDS VANITY

The ornaments of a South Sea islander are few and simple. He likes a necklace of beads or dog's teeth, or armlets made of plaited fiber or cut from single shells, and a crescent-shaped decoration of large pearly shell.

Surely these remarkable coral formations are among the most truly wonderful evidences of lavish nature—mighty, far-reaching, and enduring.

There is nothing grander or more sublime than to be brought face to face with this ever-progressive and ever-expanding phenomenon—this vast, restless force, by which insular land-masses are formed and protected by encircling reefs, the waters of the ocean held in check and the fury of the waves subdued.

It is one of the greatest wonders of nature, placed beyond the controlling influence of man, indestructible except by its own evolutionary power, but limited in range to the tropical waters of the globe. In the Pacific Ocean it attains its greatest development and on the Queensland coast it is strikingly represented by the Great Barrier Reef, extending for over a thousand miles along the shores to Torres Strait and far beyond.

As a field for the marine biologist, the Great Barrier Reef, not yet fully explored, is of wide interest and has attracted attention in most of the scientific centers of the world, alluring to its fascinating waters representatives from both hemispheres of the globe.

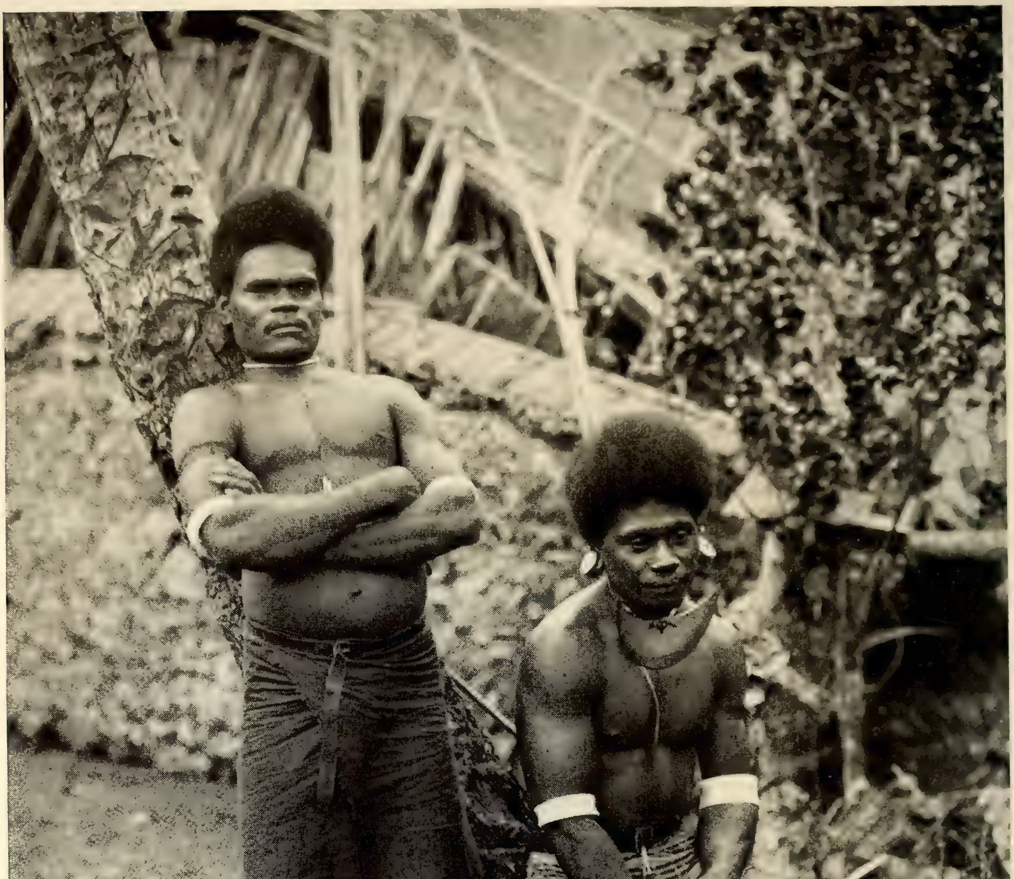
A VOLCANIC BELT FROM JAPAN TO PERU

Then, again, we find in this vast oceanic region an immense volcanic influence, a great seismic belt extending from Japan to the Peruvian coast and including New Guinea and New Zealand.

In some of the island groups the volcanoes are still in a state of activity, and several years ago the Samoan Island of Savaii was for a time the scene of one of the greatest eruptions ever witnessed.

Most of the coralline islands of eastern Polynesia, extending on both sides of the Equator, bear traces of former volcanic activity, as evidenced by the numerous extinct craters scattered over the land-masses. That they have long been quiescent is clear from the dense vegetation everywhere covering the surface, except, perhaps, on the precipitous crater rims, where the sheer walls of rock afford little encouragement to plant life.

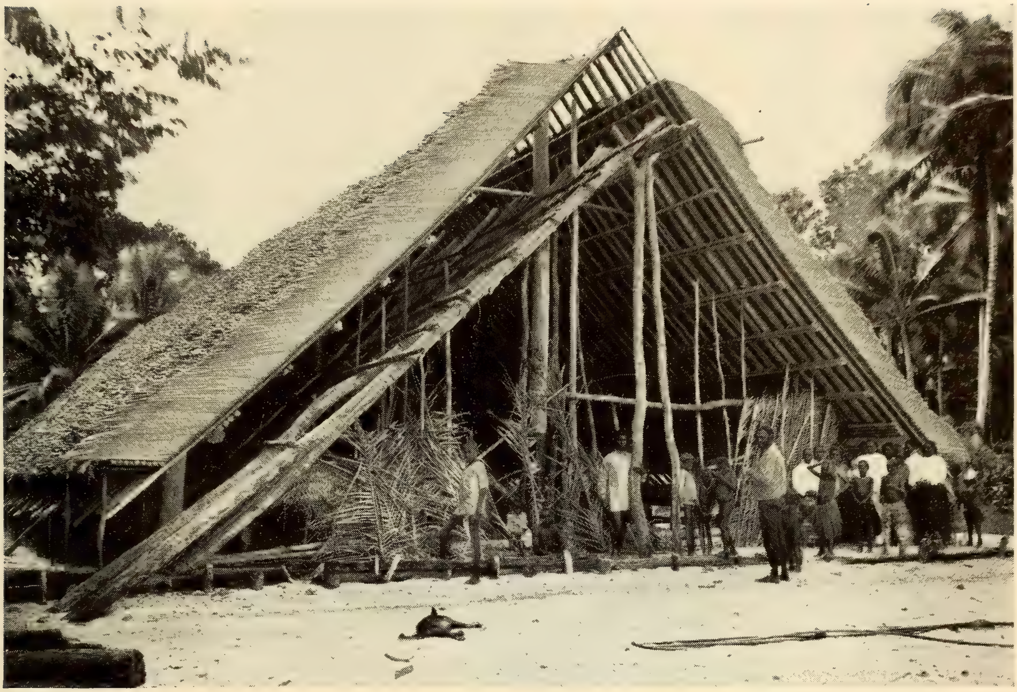
Few people realize that the Pacific



Photograph by J. W. Beattie

YOUNG STALWARTS OF THE SOLOMON ISLANDS

The inhabitants of this group of the South Pacific islands have for generations had, in civilized countries, a reputation as unsavory as that of any people on the globe—cannibalism, infanticide, head-hunting, and the practical enslavement of their women being, until recently, among their common practices.



Photograph by J. W. Beattie

A TAMBU-HOUSE: SOLOMON ISLANDS

Toward the close of the day the front of the canoe-house is a rendezvous for the natives. Here they listen to and discuss the affairs of their little world. A festival marks the completion of a new tambu-house, and formerly was accompanied by the sacrifice of a human life, the flesh being eaten and several of the bones used as decorations.

Ocean covers more than a third part of the globe and contains within its vast periphery over half of the terrestrial water supply.

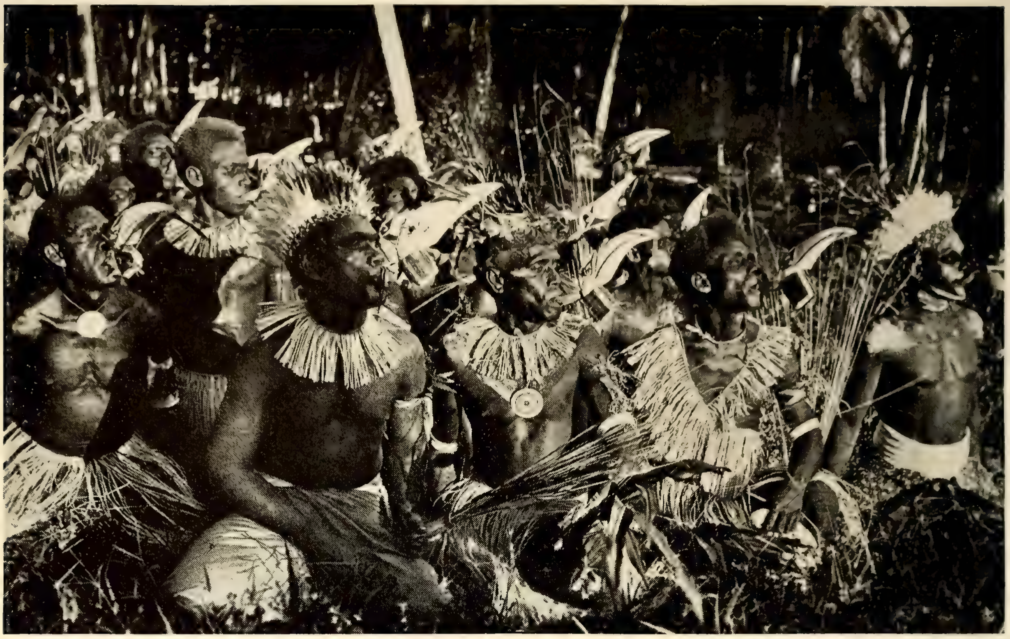
The influence exercised by this immense liquid surface on the climate and conditions of life in both hemispheres must be enormous, when we consider that it is bisected by the Equator and consequently exposed to the full force of the tropical sun. It is for this reason and because of the moist, equable temperature prevailing over the Polynesian region that we find in most of the oceanic islands great fertility of soil and a luxuriant vegetation, so that their rich natural resources afford ample provision for the inhabitants.

The early history of discovery in the "South Sea" goes away back to the days of Spanish maritime enterprise, in the beginning of the sixteenth century, when the Pacific Ocean was first seen by Balboa, on the 25th of September, 1513. Since then there have been many remarkable developments in the affairs of Polynesia, both in the occupation of the various groups of islands and in the life of the people.

MANY ISLAND GROUPS IN POLYNESIA

Geographically, the Polynesian region is occupied by numerous groups of islands of varying extent and importance, most of which are inhabited by a variety of peoples, generally known in Australia as Kanakas or South Sea Islanders.

Viewed in a broad and comprehensive light, this Polynesian Empire, if I may so call it, extends across the Pacific from the eastern waters of Australia and New Guinea for a hundred degrees of longitude to Easter Island. It includes the Bismarck Archipelago and Solomon group, New Caledonia and Fiji, the New Hebrides, Samoa, and Tonga, the Marshall and Caroline Islands, the Phœnix Group and Low Archipelago, the Hawaiian Islands, the Gilbert and Ellice Islands, the Society and Cook Islands, with numerous clusters of islands, reefs, and lagoons scattered over wide expanses of tropical ocean and studded like gems of emerald green on



Photograph from Dr. J. P. Thomson

DANCE FASHIONS IN NEW BRITAIN

The network that holds the leaves of a young coconut tree is as fine as India paper, very glossy, and of a beautiful silver color. Narrow strips of it are used as decorations by the natives in the "Kokomo" dance.

the vast coral sea that eternally surges along the equatorial belt of the great Pacific. Long regarded as the dream of early Spanish and Portuguese enterprise, these Polynesian islands have vast commercial possibilities.

MANY HARBORS OFFERING UNSURPASSED NAVAL BASES

Many of these Pacific groups possess beautiful harbors, commodious enough to shelter the largest ships of a major power. Most of them being guarded by impregnable barriers of coral reef, they would afford natural protection to all classes of shipping and could be utilized as naval bases of first-rate importance.

Commercially, the Pacific Island trade is a matter that will command world-wide attention in the affairs of national enterprise arising out of the World War. Profiting by her geographical position and the circumstances arising out of the war, Japan has made good use of her opportunities to occupy the Marshall Islands, over which she now holds a mandate, and in the struggle for a commercial footing in the Western Pacific she has shown herself a vigorous rival to British-Australian enterprise.

In physical structure these Polynesian islands are mostly composed of igneous or coralline rocks.

The moist southeast trade winds prevail over most of this region, the rainfall being generally high, especially in the eastern Solomons, about Bougainville Straits, 150 inches; Hawaii, 60 to 80 inches; New Caledonia, over 40 inches, and Suva, Fiji, 162 inches. On some of the low-lying atolls, however, the moisture-laden clouds pass over without any precipitation, and consequently there are occasionally narrow rainless zones, where accumulated deposits of guano occur, such as on Ocean and Nauru Islands (see pages 559 to 589). The rainy season usually lasts from November to April.

Although slightly relaxing, the climate on the whole is generally healthy, being free from endemic diseases, but malaria occurs on the low-lying areas in the Solomon and some other large islands.

There is an oceanic flora in the coralline groups, the prevailing forms being

Photograph from Dr. J. P. Thomson

A NEW BRITAIN NATIVE DANCE

Bodies which have been covered with oil and rubbed until they gleam and faces stained with red earth or berry juice present a weird picture to the island visitor. The women are not so fantastically dressed for the dance as the men, but they, too, are wearing their best "bibs and tuckers."

the coconut and a few other palms, the pandanus and bread-fruit tree. The edible roots are mostly represented by several varieties of the yam, the taro, and sweet potato. On the larger groups of islands, such as Fiji, the Hawaiian Archipelago, the Solomons, and New Britain, there is a rich forest vegetation mostly common to Australia and New Guinea, although generally the Papuan plants are more distinctively Asiatic in character.

ANIMAL LIFE IS RESTRICTED

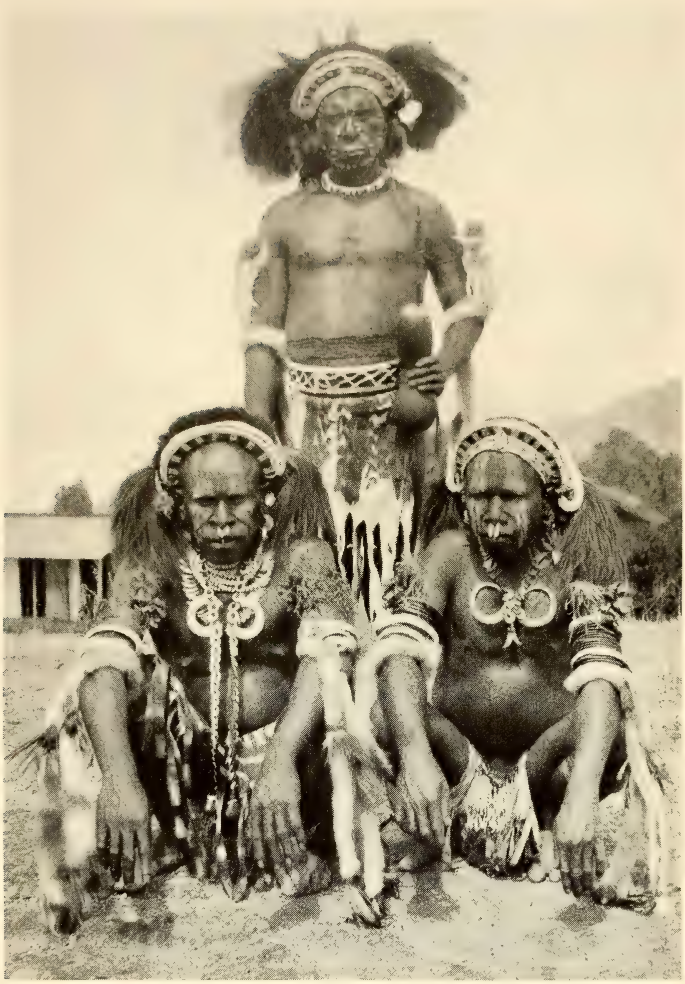
A remarkable feature of many of the Polynesian groups is the luxuriant vegetation on the southeast, or windward, side of the islands, in marked contrast to the northwest, or leeward, side, where the forest is restricted to extremely limited patches, with large reed-covered areas of wide extent, suggesting aridity and the absence of fertile soil. This is, no doubt, due to the fact that a larger percentage of moisture is deposited on the former, the prevailing southeast trade winds being comparatively dry by the time they reach the opposite side.

In strange contrast to their luxuriant plant life, the Pacific Islands cannot lay claim to a rich fauna except in birds, which are fairly numerous in New Caledonia, Fiji, and Hawaii. The dog and the pig have a wide range, being found everywhere within the influence of native settlement, but both have been introduced in comparatively recent times and are not indigenous to Polynesia.

There are several species of rodents and some representatives of the bat family, which appear to be the only indigenous mammals of which we have any knowledge. Even insects and reptiles are by no means plentiful, being chiefly confined to small lizards, centipedes, spiders, frogs, and harmless snakes.

In the Solomons the crocodile is met with, both in fresh-water streams and tidal estuaries, but here this saurian reaches its easternmost limit, as it occurs nowhere else in the island groups beyond.

From this brief description of the physical and climatic conditions of the Pacific islands, it must be clear that no place could be more ideal for the abode



Photograph from Dr. J. P. Thomson

NEW GUINEA CHIEFS

Rigid plaited frames, or curved bands with a groundwork of split cane, which support the cassowary or paradise feather head ornaments, are made by the men and worn at their dances. Necklaces consist chiefly of various sorts of disk-like shells, either cut or whole. Dancing aprons are made of bark cloth by men and women, but colored by men only. The nose rings are pencil-shaped pieces of shell about six inches long, which are passed through a hole in the nose.

of man than this great and enchanting oceanic region, this seductive "Insulandia," midst reef and palm, perpetual sunshine, and evergreen verdure, the dream of romantic youth, the home of early buccaneering enterprise, and the scene of great human struggles in tribal warfare, when the cannibal feast was deemed a fitting celebration of victory on the field of battle.

Some attention must now be given to the aboriginal inhabitants of Oceanica. Ethnologically considered, they naturally belong to two distinct classes or divisions of the human family, beginning first of all with the Polynesians, comprising the Maoris, Samoans, Fijians, and Tongans, whose racial affinities are still in dispute. In physical characteristics they are round-headed, narrow-nosed, of a light-brown café-au-lait color, with round orbits and lank, black hair. They are tall and well set up.

On the other hand, the second division, known to ethnologists as Melanesians, are long-headed, broad-nosed, of a sooty black color, with low orbits, black, frizzly hair, and are comparatively short of stature. Intellectually they are of a lower order than the former class, some being cannibals and head-hunters.

In the primitive state the Melanesians are savage and not infrequently treacherous, in contrast to the Polynesians, who, on the other hand, are altogether a superior race of people, intelligent and capable of reaching a high standard of culture, as shown by the positions they have gained in the public service in New Zealand and in Hawaii.

But even the Melanesians of the present, with the exception of those comparatively few natives living in remote and isolated inland villages, are not the same class of people as those met with in the early days of missionary enterprise, when pioneering intercourse was not always attended with freedom from danger to the white trader, recruiter of labor, or planter. Now it is an easy matter to land on any of the islands and do business with the natives without risk of hostile attack. The Polynesian of today is in point of fact a keen trader and fully alive to the advantages of Western civilization.

PEOPLED BY PHŒNICIANS?

As to the origin of these Pacific islanders, opinions differ, it being held by some authorities that they have been allied to various races, including the Aryans, the American aborigines, and the Papuans.

In the writer's view, there can be no doubt that the islands of Polynesia were originally peopled by Phœnicians, whose migratory influence extended to the coast of Peru. This theory is strongly supported by the presence of the numerous cyclopean monuments, huge monolithic statues, paved avenues, and ramparts of walls of basaltic blocks over thirty feet in length, brought from great distances, on Easter Island and in the Carolines. It is evident that none of the present races could erect such immense structures as these (see pages 598 and 600).

The subject is fascinating and could be further elucidated to any extent, under circumstances appropriate to its discussion.

Photograph by A. Nielen

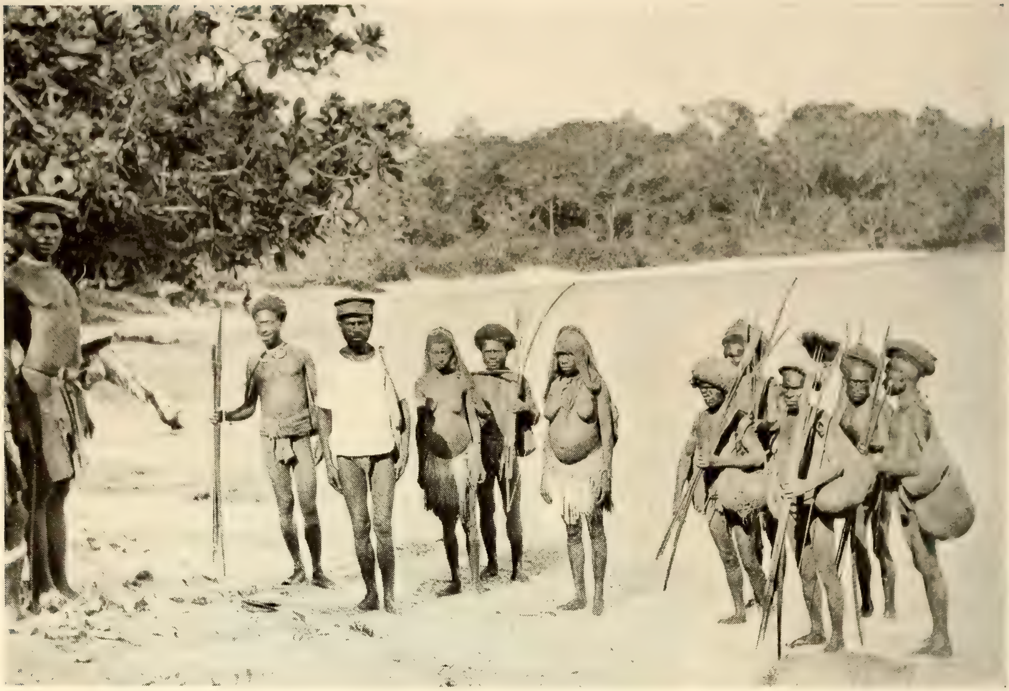
A HAVEN OF REST: NEW GUINEA

With the yam, taro, and banana available, it is difficult to convince the Papuan that he should work for wages, for which he has no use.

MYSTERIOUS RUINS ON EASTER ISLAND

The remarkable ruins of ancient settlement in the Caroline Islands are one of the mysteries of Polynesia and will probably never be solved. When it is considered that some of the stones forming the walls of those extensive ruins are of immense size and are supposed to have been brought from other islands of the group across storm-tossed channels and placed in their present position with precision and masterly skill, it is apparent that all this could not have been done by people akin to the present inhabitants, but must have been the handiwork of skilled craftsmen similar to the builders of the ancient ruins in Peru and Mexico and perhaps, also, Africa.

If this view be accepted as reasonably sound, we may assume that Polynesia was formerly the home of a civilization that has long since disappeared and become extinct, leaving imperishable monuments of skilled craftsmanship on Easter



Photograph from Dr. J. P. Thomson

TRADERS FROM THE HILLS ON A VISIT TO THE LOWLANDS: NEW GUINEA

There is a never-ending feud between the mountain and shore people of New Guinea. However, since necessity knows no law, the men come down from the hills to trade bows and arrows for pottery.

Island and the Carolines, or else the islanders are a decadent people.

Be this as it may, the fact remains that these ruins are a mystery to the present inhabitants of the Pacific islands, who have no knowledge of the art of building in stone and are ignorant of architecture, apart from their own primitive huts.

Even native tradition is singularly silent as to the origin of the inhabitants and their migratory movements among the island groups.

THE FATE OF THE EARLY INHABITANTS AN UNSOLVED PROBLEM

As to the fate of the original prehistoric inhabitants, who left such indelible traces of a higher order of civilization behind them as exists in the cyclopean ruins of the Carolines, we have no means of knowing, and mere conjecture can help but little. Whether they were overwhelmed by some mighty and widespread cataclysm or exterminated by epidemic disease will probably never be known.

Is it possible these ruins may have had their origin in some migratory wave sweeping across the Pacific from the shores of Asia to the coast of South America? Had this been the case we should expect to find some marked traces of Asiatic blood in the present inhabitants; but instead of this the dark Melanesians bear greater resemblance to the Papuans, while, next to the Patagonians, the Polynesians are the tallest people on the globe and are allied to the Maoris of New Zealand.

The only feature in which they bear any resemblance to the peoples of Eastern countries is in the practice of circumcision, and this is not general, but mostly confined to the Western Pacific.

In point of fact, there is stronger ground for assuming that the Polynesian peoples are remotely allied to the Australian aborigines, on account of the ceremony of initiation of youths into the rites of manhood which is practiced by both. In Australia this is known as the "Bora" ceremony, and in the Fiji group it is called the "Nanga," both having the same significance and purpose, with only slight variations in the mode of procedure, as clearly established by the late Rev. Lorimer Fison in collaboration with the writer, whose investigations extended over several years.

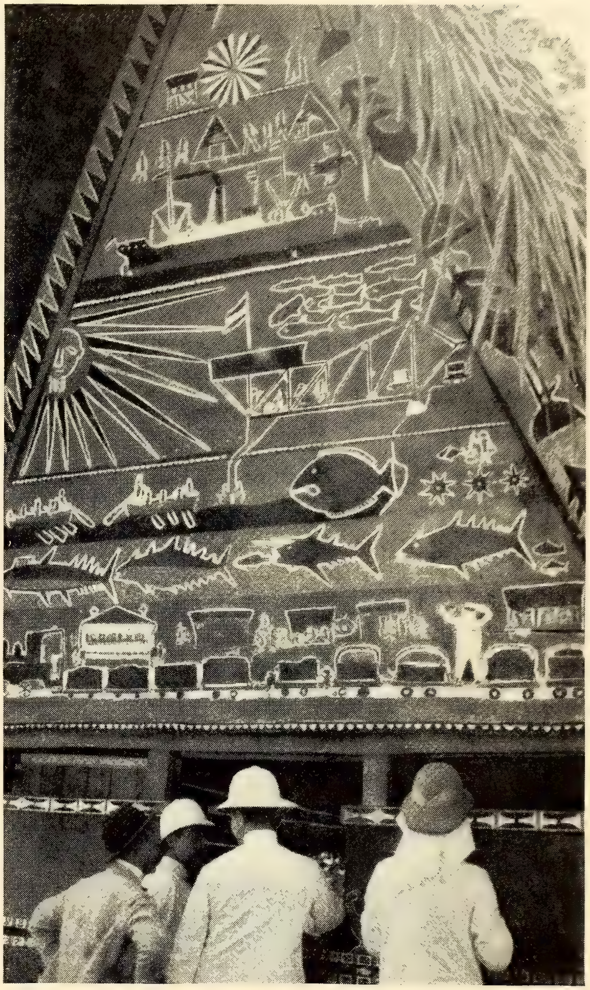
PHOSPHATES IN LIEU OF MINERAL WEALTH

In natural resources these Pacific islands differ to some extent from Australia, New Zealand, and New Guinea, there being, so far as is known, an absence of great and rich mineral deposits; but the soils are extremely rich, and for the production of sugar, cotton, rubber, coconuts, bananas, coffee, cocoa, rice, pineapples, and many varieties of fruit and vegetables they are eminently suitable and probably unsurpassed. It would indeed be difficult to name any product of tropical origin that could not flourish in the fertile soils of Polynesia.

Among the greatest of all the natural resources of these oceanic territories the enormous deposits of high-grade phosphates on several of the Polynesian islands are of prime importance. This is especially so in the case of Nauru, or Pleasant Island, a small, isolated spot half a degree south of the Equator and rising about twenty feet above sea-level. It is estimated by Dr. Paul Hombrun to contain about 497,700,000 tons of the richest phosphates to be obtained anywhere, the quantitative analysis giving from 83 to 90 per cent of tricalcium phosphate (see page 567).

Although this remarkable little isle has no harbor, the phosphates are loaded into the freighters at the rate of 100 tons per hour by special contrivances. The Ocean Island high-grade phosphate deposits are estimated at 12,500,000 tons.

There are also rich phosphate deposits on the islands of Angaur, in the Pelew group, and Makatea, the estimated quantity on the latter—an island belonging to France, on the western side of the Tuamotu or Low Archipelago—being 10,000,000 tons.



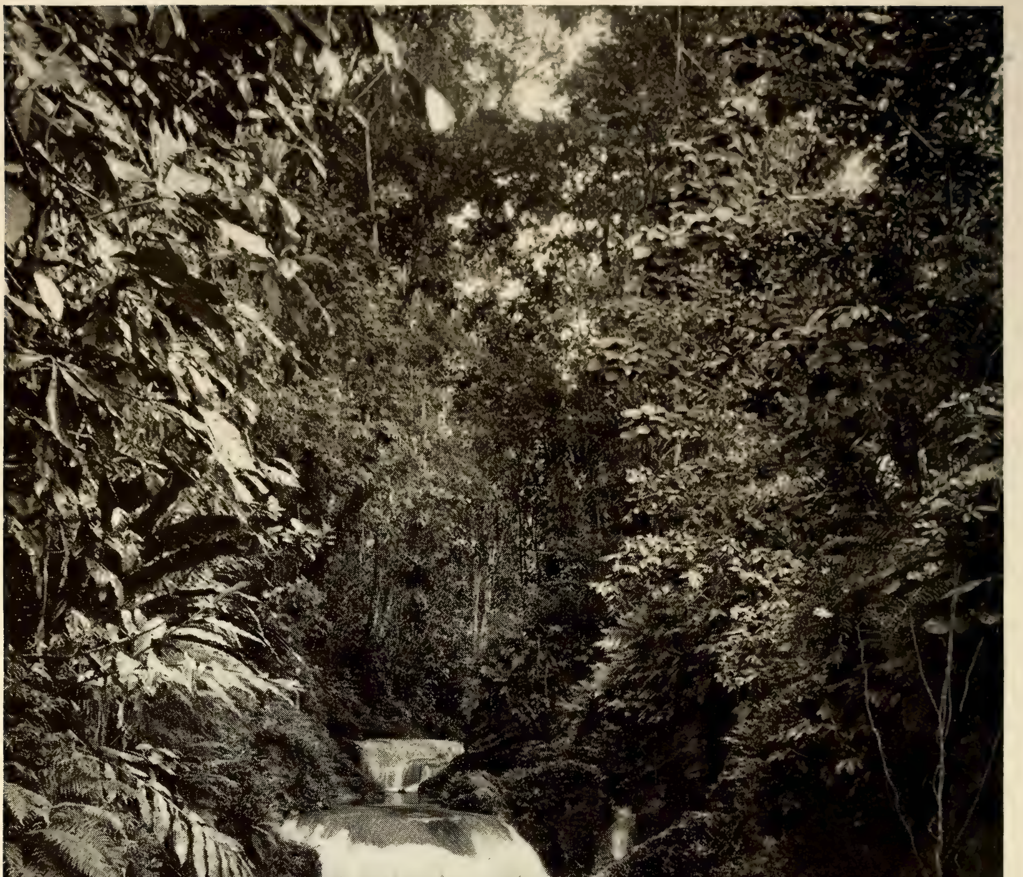
Photograph by A. Nielen

MURAL ART IN NEW GUINEA

PACIFIC ISLANDS DISTRIBUTED AMONG MANY NATIONS

Before the World War the Nauru and Angaur deposits were in German hands. This suggests some brief consideration of the political or pre-war condition of these Pacific groups, especially in the light of their occupation by European powers and their present relation to the Australian continent and to New Zealand.

At the outbreak of the World War the Pacific islands were in the possession of the United States of America, Great



Photograph by J. W. Beattie

SUCH CASCADES AS THIS ON THE PACHU RIVER, IN CHOISEUL, SERVE TO JUSTIFY THE USE OF THE PHRASE "SCENIC PARADISE," SO OFTEN APPLIED TO THE ISLANDS OF THE PACIFIC

Photograph from Dr. J. P. Thomson

TYPICAL SAMOANS

The lightest of their race in color, the Samoans are true Polynesians, prepossessing in appearance and manner, and of splendid physique. The men treat their women with great respect and kindness and lavish affection upon their children. They are scrupulously clean, bathing at least twice a day.

Britain, France,* and Germany. Japan at that time had but small interests, as occupant of the Bonin (Ogasawara) Islands, a small group of about 38 square miles in extent.

In area and population the United States possessions certainly rank first in importance, the comparatively large territories of the Philippines and the Hawaiian Islands, with American Samoa and Guam, giving that country premier place among the great powers interested in the Pacific.

The possessions formerly held by Germany in the Pacific were: Kaiser Wilhelm's Land—area, 70,135 square miles, population, 110,000; Bismarck Archipelago and a part of the Solomon group—area, 22,046 square miles, population, 210,000; Caroline Islands—area, 598 square miles, population, 30,900; Mariana Islands—area, 241 square miles, population, 1,118 (exclusive of Guam); Marshall Islands—area, 156 square miles, population, 10,000; German Samoa—area, 993 square miles, population, 37,000.

It will thus be seen that, with widely scattered territories aggregating 94,169 square miles, stretching diagonally across the Pacific from Samoa on the southeast to the Mariana Islands on the northwest, for a distance of over 3,300 miles and parallel to the seaboard of northeast Australia, Germany held the key to the Western Pacific.

ISLANDS SUITABLE FOR NAVAL BASES

On each of these groups enumerated a naval base could be established and its position rendered secure against attack by suitable fortifications and the natural advantages afforded by the coral-reef structures.

Once this was done, a hostile power would be in a position practically to dominate the whole of the Pacific Ocean. With submarines and a fleet of destroyers,

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* For an account of the Marquesas Islands, owned by France, see "A Vanishing People of the South Seas," by John W. Church, in the October, 1919, number of the NATIONAL GEOGRAPHIC MAGAZINE.

Photograph from Dr. J. P. Thomson

THE GRAVE OF ROBERT LOUIS STEVENSON, ON OPOLU, SAMOAN ISLANDS

On the summit of Mount Vaea a cemented monument, in accordance with native design, has been erected, by native labor, over the grave of Robert Louis Stevenson. On the side facing the east are carved his own words:

"Under the wide and starry sky,
Dig the grave and let me lie,
Glad did I live and gladly die,
And I laid me down with a will.

"This be the verse you grave for me:
Here he lies where he longed to be;
Home is the sailor, home from sea,
And the hunter home from the hill."

Chiseled on the tomb are a thistle and a hibiscus flower, typical of his countries.

it would be a simple matter to isolate Australia and New Zealand, as the enormous oil supply of Sumatra, the coals of Australia, and the inexhaustible food resources of the Pacific islands would obviate the necessity of leaving the locality for supplies of any kind. And from such a position it would be equally effective in blocking the Panama Canal, in interrupting communication across the Indian Ocean, invading the East Indies, the Philippines, and menacing Japan.

CONTROL OF THE ISLANDS REDISTRIBUTED

In point of fact, there is no other region on the globe possessing such remarkable natural facilities for the dominating purposes of an ambitious and aggressive power.

As an outcome of the defeat of the Central Powers and the distribution at Paris of the control of enemy colonial possessions, the Australian Mandate gives to that commonwealth complete control over Germany's former Pacific territories, with the exception of Samoa, the Marshall, Caroline, and Mariana Islands, and the phosphate deposits of Nauru, the ownership of the last named being shared with Great Britain and New Zealand.

German Samoa was placed under a New Zealand mandate.

The Japanese hold the Marshall, the Mariana (except Guam), and the Caroline Islands under the Peace Conference mandate, and have lost no time in getting a firm footing, not only there, but in other groups of the Pacific, for the purpose of trade.

There is a monthly service of steamers between Japan and the Marshall Islands, and Japanese goods are being distributed among the islanders in all the groups of the Pacific.

NAURU, THE RICHEST ISLAND IN THE SOUTH SEAS

BY ROSAMOND DOBSON RHONE

THE mandates for the Pacific islands which formerly belonged to Germany were assigned to the powers who seized them in the first year of the war: to Japan, the German islands north of the Equator; to New Zealand, German Samoa; to Australia, German New Guinea, the German Solomons; to Great Britain, the island of Nauru. There have been doubts expressed as to whether these mandates are not proving to their holders more of a burden than an asset, but Nauru is probably the richest spot on the globe for its size.

This is a story of the island whose name has risen to notice in the new geographies, as a by-product of the upheaval caused by the World War, just as, owing to some geological upheaval ages ago, the island itself arose from the sea.

GERMANY CAME LATE INTO THE PACIFIC

This story of Nauru under white control is the story of German possessions in the South Seas. Germany came late into the Pacific; all the good things had been taken. The explorers — Dutch, British, French, and Spanish—had pretty well divided up the islands, for in their day "findings were keepings."

The German colonial policy was undertaken in 1883 by financing certain chartered companies which had been trading with the islands for about 25 years. By this means Germany acquired a protectorate over a part of northern New Guinea. A protectorate is the camel's nose in the tent. When he gets his head in and his hump, it becomes a colony.

New Guinea is shaped like a dragon, with a Dutch head and shoulders, British underparts and tail, and German back and rump. Perhaps, from the German colonial point of view, their portion was the saddle, in which they would override the entire Pacific.

In 1886 an agreement between Great Britain and Germany, defining the "Limit of spheres of influence in the Western Pacific," was signed at Berlin. This was the camel's head and hump. By this all lands unappropriated by other powers were divided between the two contracting parties. It was something like the division of the earth between Abram and Lot—one took the East and the other the West. In this case Great Britain took the East and Germany the West.

The language of the deed is not like the language of deeds of land; there are no corners and boundaries of adjacent properties; no "lands, tenements, and hereditaments"; but the terminology of navigation is drawn upon to furnish the descriptions.

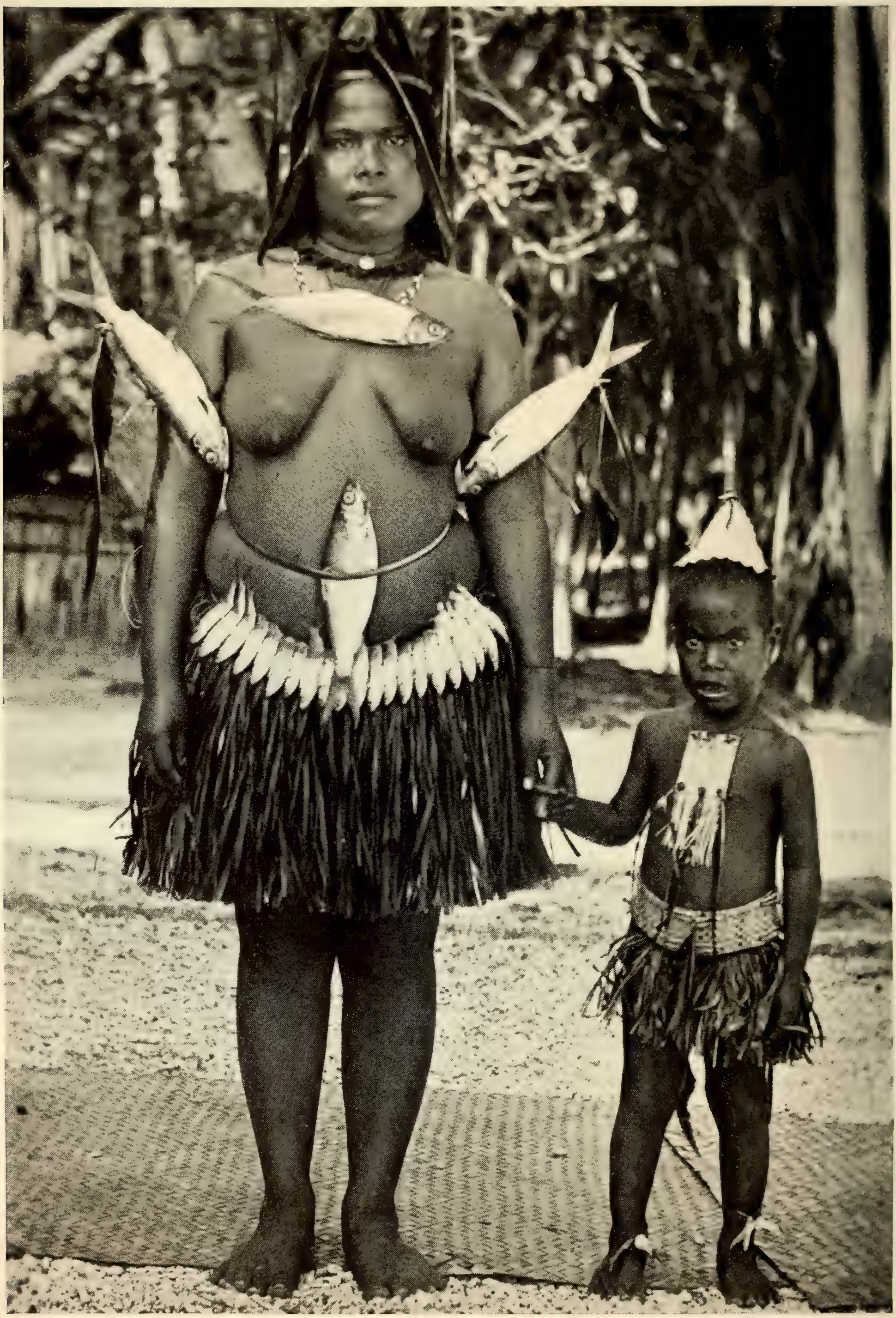
The division line starts on land, but at once puts out to sea. It begins at a point on the northeast coast of New Guinea on the boundary line between British and German territory, thence east along a parallel of latitude to a point in the Pacific Ocean marked on a British admiralty chart, thence from point to point on admiralty charts to a point fifteen degrees north latitude and 173° 30′ east longitude.

GERMANY PURCHASED ISLANDS FROM SPAIN

This line of cleavage gave to Germany the Marshall group, a large number of islands north of New Guinea, rechristened the Bismarck Archipelago, some of the Solomon Islands, and a small coral island almost under the Equator, which is Nauru.

Three years later Germany added to her Pacific holdings by buying from Spain the Caroline group west of the Marshalls, and the Ladrones, with the exception of Guam, which had been previously acquired by the United States as a by-product of the Spanish-American War.

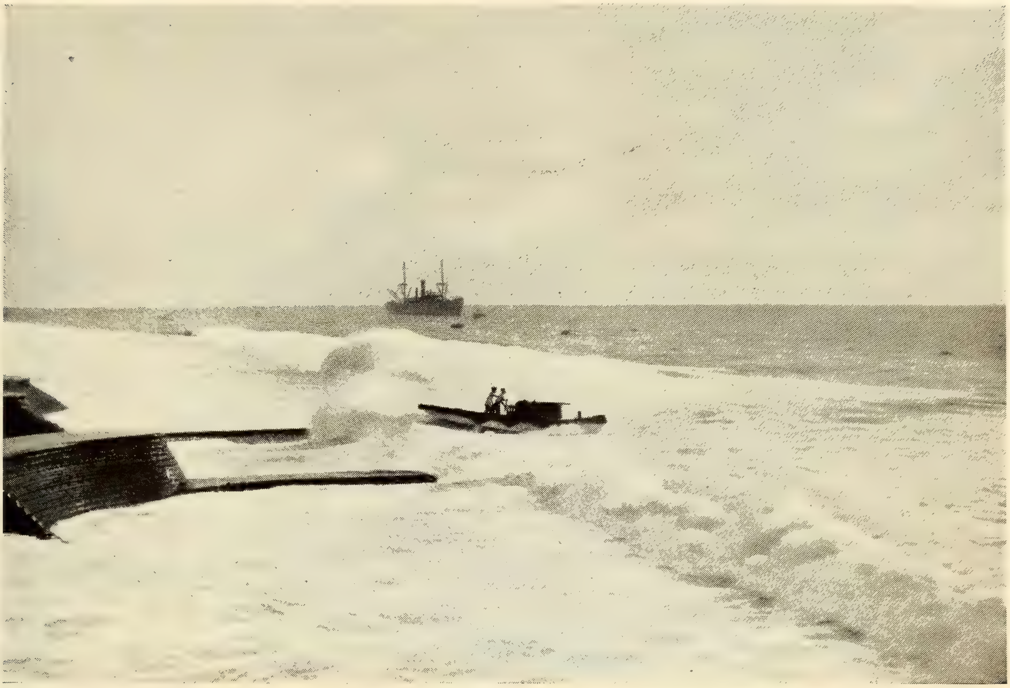
About the same time, she acquired by agreement with Great Britain and America (ceding to the former part of the Solomon group) two islands in the Sa-



Photograph from Mrs. Rosamond Dodson Rhone

A SOCIAL LEADER OF NAURU IN COSTUME FOR THE CELEBRATED FISH DANCE

The "Dance of the Fish" must be a joyous one for its participants. The finny decorations range in color from rainbow to scarlet, blue, yellow, black, and green, and are eaten when the dance is finished.



Photograph from Mrs. Rosamond Dodson Rhone

OBVIATING THE DIFFICULTY OF HARBOR NAVIGATION AT NAURU

Because of the coral reef, which slopes beneath the sea at an angle of 45 degrees off Nauru, the phosphate company has provided deep-sea moorings. Large buoys lie on the surface of the sea at a safe distance outside the edge of the reef, while small ones are lined close to it. A motor launch operated by a native engineer is seen leaving the small-boat harbor and crossing the reef through the surf at high tide (see text, page 573).

moan group, one of which was the last home of Robert Louis Stevenson and on whose summit is his tomb (see page 558).

In this way Germany acquired her island possessions; she held them for about thirty years; we all know how she lost them.

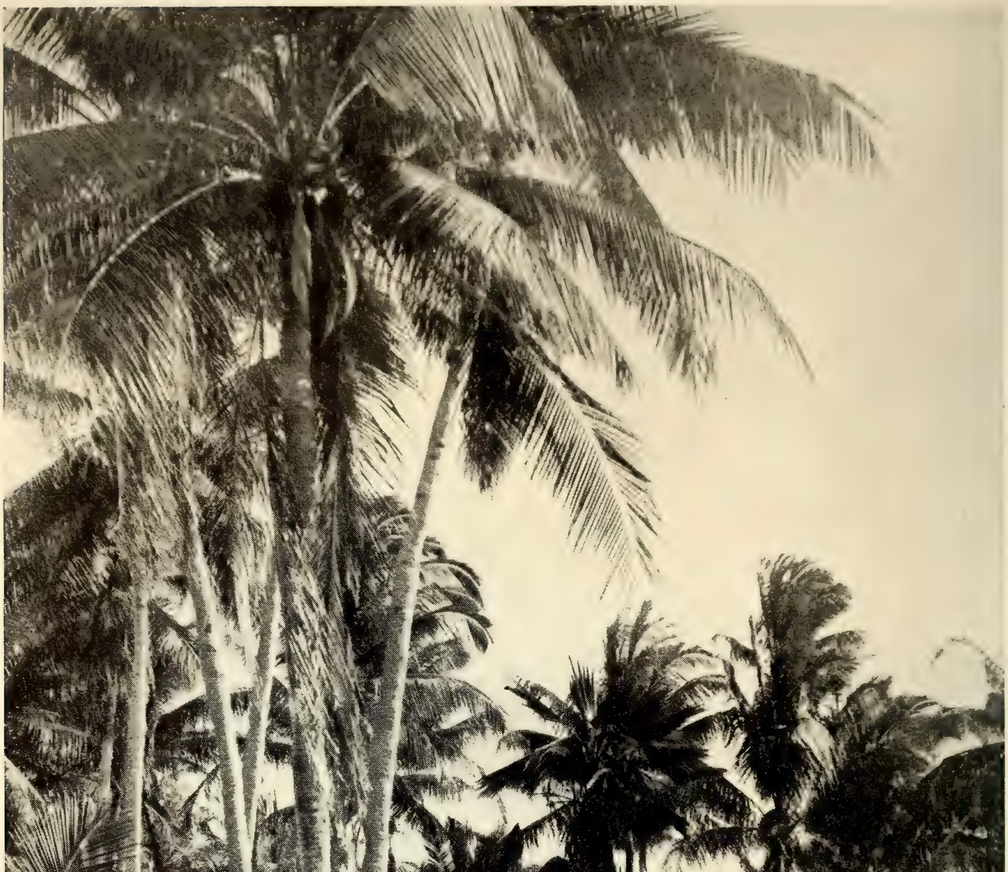
When Germany took possession of the islands she made Jaluit the seat of government for the Marshalls and assigned Nauru to that group, although it was an island altogether *on its own,* as the British say, having its own language and customs and lying 300 miles distant. There is no physical likeness, as it is an upheaved coral island, while the Marshalls are low-lying atolls.

AT THE "JUMPING-OFF PLACE" OF THE WORLD

Nauru, or Pleasant Island, is almost at the jumping-off place of the world; it is not exactly "East of the sun and west of the moon," but it is almost the farthest east, being only thirteen degrees west of the international date line, and it is a half degree south of the Equator. It is one of the *Line* islands.

Before it fell to Germany it knew no white rulers, but was governed by its own immemorial laws, enforced by its own chiefs; but white influence had impinged upon it for many years. Whaling ships from New England ports called there and traded firearms for drinking coconuts and island pigs. It was rather a poor island in those far-off days, before its great wealth was discovered. It had no sandalwood or tortoise shell; no pearls or *bêche-de-mer;* not even copra, for copra was not made in the Pacific before 1872 and coconut oil was not an article of commerce.

There are on Nauru two monuments to contact with American whalers. One is of flesh and blood—a native family whose curly hair is in striking contrast to their straight-haired neighbors, witnessing that the ancestor was a runaway negro sailor. The other is a small can-



Photograph from Mrs. Rosamond Dodson Rhone

NAURU ARCHITECTURE

The houses built on piles are usually smaller than those built on the ground. The former, about 22 feet in length and 15 feet in width, are supported on a framework of stout poles fastened to the top of the piles by broad strips of rattan. The ground houses average 30 feet in length by 20 feet in width.

Photograph from Mrs. Rosamond Dodson Rhone

A PHOSPHATE TRAMWAY

This electric tram line is used to haul phosphate to the piers, where it is shot into the surf-boats to be carried to the cargo vessel. In Australia, where some 200,000 tons of this fertilizer are used each year, phosphate has doubled the wheat crop.

non, which stands before the house of the British administrator.

THE ISLANDERS' REVENGE

In the fifties, a whaling ship out of New Bedford, Massachusetts, called at the island, and the natives paddled out in their outrigger canoes and swarmed over the decks, examining everything with lively curiosity. They especially admired a small cannon, whose polished brass glittered in the tropic sunshine, and they offered to buy it, paying for it with coconuts. A price was agreed upon. They went ashore and returned with the required number, but the captain raised the price, asking double the number.

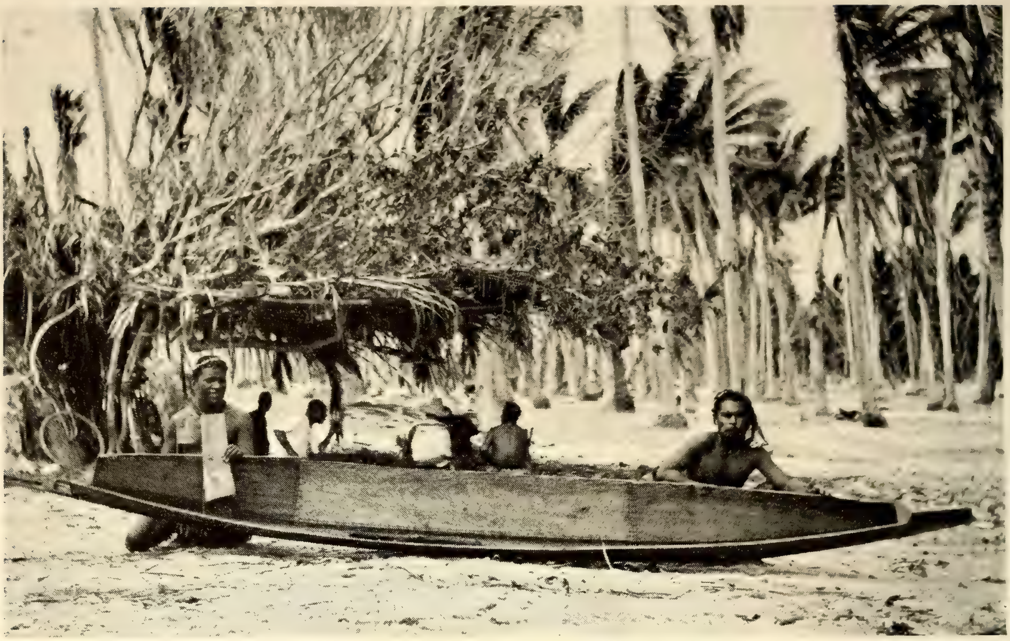
The natives again went ashore and brought back the stipulated number; the captain again raised the price. It was now late in the day and the natives said they would bring the remainder in the morning. They beached their canoes and retired to their huts, while the crew, drinking the delicious coconut milk and feasting on the delicate meat, no doubt felicitated themselves, as the ship drifted about waiting for the dawn, on their cleverness in outwitting the simple savages.

In the night the natives went out in force, surprised and overcame the officers and crew, and killed every man save one sailor who secreted himself. They set fire to the ship and took the cannon; they took nothing else!

Other white influences were traders who took native wives, and the traditional "beach-combers"—runaway sailors, sometimes escaped convicts, and white men "gone native," who lived in native huts upon native food.

There were also more benign influences. French Catholic missions and English and American Protestant ones were established. The island became nominally Christian, but without abandoning the combats between the tribes.

The Nauruans have never been cannibals, but they had the reputation of being savage warriors. A traveler from New Zealand—not Macaulay's New Zea-



Photograph from Mrs. Rosamond Dodson Rhone

COÖPERATION IN CANOE-MAKING

All the men turn out on Nauru for canoe-making. The felled tree is dragged to the beach, where it is trimmed and barked, to the accompaniment of shouting and singing. It is floated to the village and beached; then the experienced canoe-maker hollows and shapes it with a stone adze.

lander standing on a broken arch of London Bridge—who visited the island just before the Germans took possession, found the natives all armed and involved in deadly feuds. He counted nine kinds of rifles of English and American make, besides several cannon. There were then ten white traders living near each other along the beach and some of their half-caste descendants are there today.

When Germany took over the islands she gave the natives a certain number of days to give up their arms. They generally obeyed, but a few threw theirs into the caves which underlie the island, where they are found from time to time by exploring parties.

GOOD ROADS CREDITED TO GERMANY

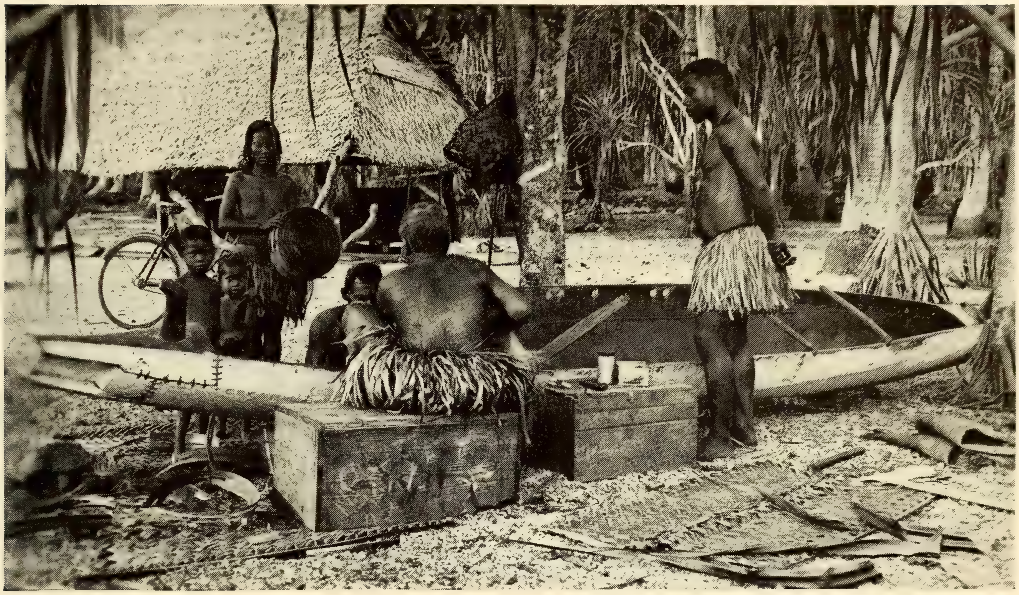
There are two things to the Germans' credit in the Pacific: They built roads and they taught the natives to make copra.

The native method of making coconut oil was to rely upon the sun's heat to extract it from the broken up or shredded meats, and to finish the process by putting the shredded coconut into a bag made of the canvas-like stipules of the coconut leaf and placing it under a clumsy press which was merely a timber, one end of which was thrust into a notch in a tree trunk, while upon the free end the weight of several persons was thrown.

This was work, and the South Sea islander does not take kindly to work. He has made coconut oil for his own use in this manner from the time "when the memory of man runneth not to the contrary," but he could not be persuaded to make it commercially.

Copra is easily made and stored. The meat of the ripe coconut is broken into pieces and dried in the sun just long enough to extract the moisture; then it is bagged and ready for sale.

In the South Seas copra is a magic word. For this the Pacific trader dares the malaria and savages of the Solomons and the New Hebrides, and the teeth of the coral reefs. The trade store and copra shed stand on the beach of every coral isle, and when a steamer or



Photograph from Mrs. Rosamond Dodson Rhone

SOLVING THE SHIP-TONNAGE PROBLEM IN NAURU

In the building of an outrigger canoe, one man is in charge and does most of the work, but timber for the outrigger and platforms must be provided by his assistants. Coconut sennit is used to fasten the timbers together. The woman in the background is holding a roll of pandanus strips used in basket-making and in weaving mats such as the ones in the foreground. The latter constitute the "weather boarding" for native houses.

schooner calls, the surf-boats go in and out, over the reef at high tide or through intricate channels when there is an open lagoon, carrying trade goods and returning with bags of copra.

The Germans promulgated laws, the chiefs being held responsible for their enforcement. Taxes were imposed—head tax, dog tax, and bicycle tax—and the men were required to work on the roads three days of each week.

THE STORY OF THE DISCOVERY OF PHOSPHATE

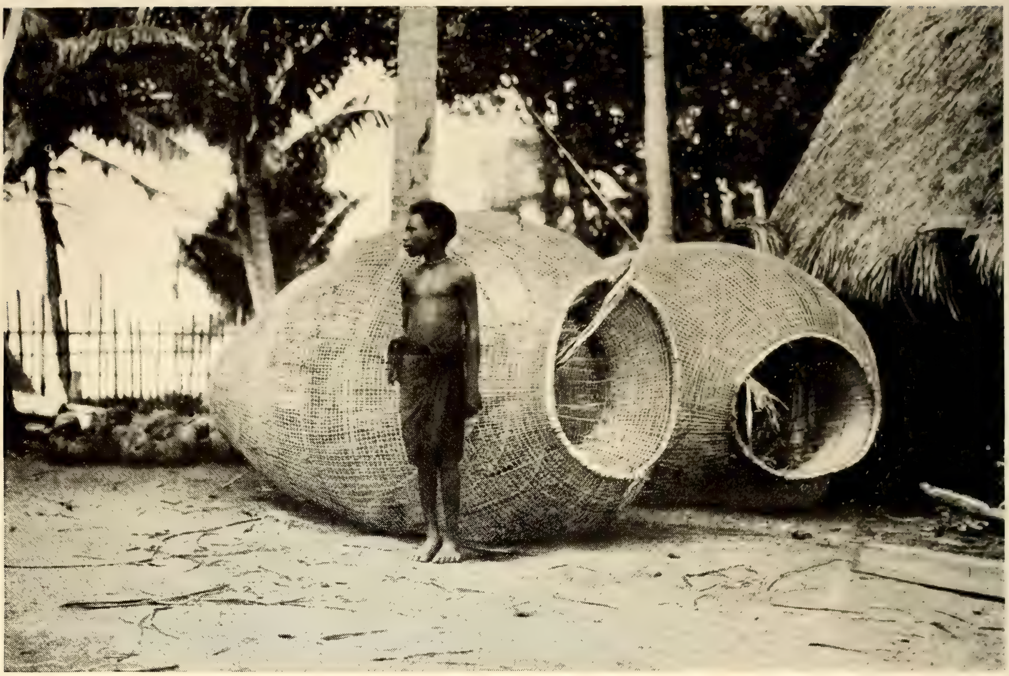
The colonial government did not know what a treasure they had under their feet, but were content to run a little trade store, a branch of the Jaluit store, which sold to the natives tobacco and beer, Alaska canned salmon, sugar, rice, and ship biscuits in exchange for copra. They also sold prints and thin Japanese silks for the Mother Hubbard dresses which the American missionaries taught the native women to wear and for the lava-lavas which the native men wore to the mission churches.

Then came a great change, owing to the discovery of phosphate.

One day Nauru, like Aphrodite, arose dripping from the sea. The date of this emergence cannot be more nearly indicated than *ages ago,* and the term *day* is not limited to twenty-four hours, but is to be construed liberally, like the *days* of Genesis. The island may indeed have been thrust suddenly into the air, with all her lovely polyps gasping and shriveling in the tropic sun, and scarlet fishes and long-armed octopi leaping affrighted out of the exposed caves to the safe shelter of the sea, while slow-moving sea-urchins and mollusks perished in the pot-holes and labyrinths of the coral; or the process of elevation may have been gradual, life in the coral dying gradually at the emerged top, while it remained in full vigor just beneath the level of low tide.

At any rate, when the upheaval was complete, when the fairy towers and pinnacles and the unsunned caverns of the sea had been lifted into the blaze of the sun, life at its base beneath the sea continued unabated and the fringing reef was slowly extended around it.

At this period the island must have looked like those fantastic artificial structures which we see in aquariums. No



Photograph by A. Nielen

THE TACKLE OF THE SWAMP FISHER OF THE SOUTH PACIFIC

Rattan is used in the making of these fish traps. They are five or more feet high and are set in swamps, especially in New Guinea. The fisherman roasts his catch in a covering of cane and bamboo.

product of man's construction could be more extravagant in conception than these pinnacles, towers, bridges, flying buttresses, their shapes always suggesting architectural fantasies upreared into the air. There it stood, bare and bald as did the earth on that day in Genesis when the dry land first appeared.

THE SEA-BIRDS BRING WEALTH

Then came the sea-birds, millions and millions of them, feeding on the abundant sea-food, nesting in the coral, hatching their young in ever-increasing multitudes, and depositing the waste of their bodies in the coral till the lower crevices were filled and a gradually rising body of guano attained at length a level with the tops of the pinnacles, and then rose above them and lay in a level plateau across the island.*

On the margin the rains, the winds, and the breakers, spouting high against the coral, washed away this deposit, so that ramparts of bare pinnacles stood up and still stand all around the island; but the coral walls back from the shore held safe the treasure. Came another day (I am aware that I am flinging *days* about as casually as the author of Genesis). The sea-birds were gone; not a keen red eye or swift-diving wing was left; gone, immemorially gone. How or why is a mystery.

Then in the alembic of Nature a transformation occurred. Guano is chiefly phosphoric acid and nitrogen; coral is chiefly lime. Somehow, by the close contact, the guano became changed into phosphate of lime, which is guano raised to the *n*th power. It had now become a hard rock, odorless and generally colorless, although some specimens show fine, dark stratification and take a high polish.

Another day—perhaps the same day—(it is startling to see how closely this follows the Genesis story of creation)—vegetation appeared, narrowly limited in species, but abundant in specimens; and finally man, the brown people of the South Sea. This must have been the

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*See, also, "Peru's Wealth-Producing Birds," by R. E. Coker, in the NATIONAL GEOGRAPHIC MAGAZINE for June, 1920.

Photograph from Mrs. Rosamond Dodson Rhone

AN ILLUSTRATED FISH STORY

The most popular forms of fishing paraphernalia used on the island of Nauru are bows and arrows and spears. This catch of brilliantly colored fish seems to be a satisfactory one. The tree in the background is a banyan.

order, for where there is no vegetation there is no population.

The vegetation owed nothing to the wealth of phosphate beneath it. Phosphate is not soluble in water. It needs treatment with sulphuric acid, which converts it into superphosphate to let loose its treasure of stimulation for plants.

East of Nauru, 160 miles, lies Ocean Island, or Banaba, another island the story of whose origin is Nauru's story. Like twin sisters they stand unrelated to their nearest neighbors, the low-lying atolls, their only relative being the island of Makatea in the Tuamotu group (Paumotos), more than 2,000 miles distant, where the evolution of phosphate followed the same lines.

A DISCARDED DOOR-STOP PROVES CLUE TO FABULOUS WEALTH

A few years ago the Pacific Islands Company had schooners cruising in the Pacific for various tropical products, especially guano, which was growing so scarce that they were "brooming" it from tiny coral islands. One of the captains brought from Ocean Island to the Sydney office of the company a piece of curious stratified rock with the suggestion that it might be made into children's marbles. This rock remained knocking around the office for years, being used as a door-stop. Finally the manager of the company analyzed it and found to his amazement that it was 80 per cent phosphate of lime. He boarded the next schooner sailing for Ocean Island, which had fallen upon the eastern side of the line of demarkation and so became British territory.

The Pacific Islands Company was reorganized as the Pacific Phosphate Company. The British Colonial Government granted permission to buy land of the natives for opening quarries and building a plant with crushers, loading bins, and tramways, and before the war interfered with the shipping the annual output was 100,000 tons, worth when loaded on the ships $12.50 per ton.

As soon as the phosphate works were

Photograph from Mrs. Rosamond Dodson Rhone

A NAURU "TOPER"

After the coconut has attained full size, and long before it is ripe, it contains a pint or more of delicious juice, called in the different languages of the islands, wine, water, or milk, and what could be more refreshing in the blistering heat of the tropics than this cool drink, with its bit of a tang!

established upon Ocean Island, the company extended its operations to Nauru. Application was made to the German Government for a concession, which was granted on condition that the Germans were taken into partnership. A fine plant was built on the lines of that at Ocean Island. There was a British manager and a German manager, each with his own staff.

A white settlement was built, the Germans bringing knock-down houses from Germany, which were set up in rows and named "Berlin," "Stuttgart," "Cologne," while the British houses were named for British and colonial cities. Each house had a garden of flowers, the walks edged with white coral; in the German gardens the walks were bordered with inverted beer bottles.

A German governor was sent to the island. A two-story house was built for him (the only one on Nauru) and a full-length portrait of the Kaiser hung on its wall. The grounds were planted with beautiful tropical trees and shrubs, and the flag with the two-headed eagle was hoisted on a tall pole on the beach.

On the hilltop was erected one of those fine wireless stations which Germany placed at each of her strategic points in the Pacific. This was a triangular mast of structural steel 420 feet high, resting upon glass disks and guyed to massive concrete pillars. *Then came the war!* How many stories of fact and fiction contain these words—*then came the war.*

"UNDER TWO FLAGS"

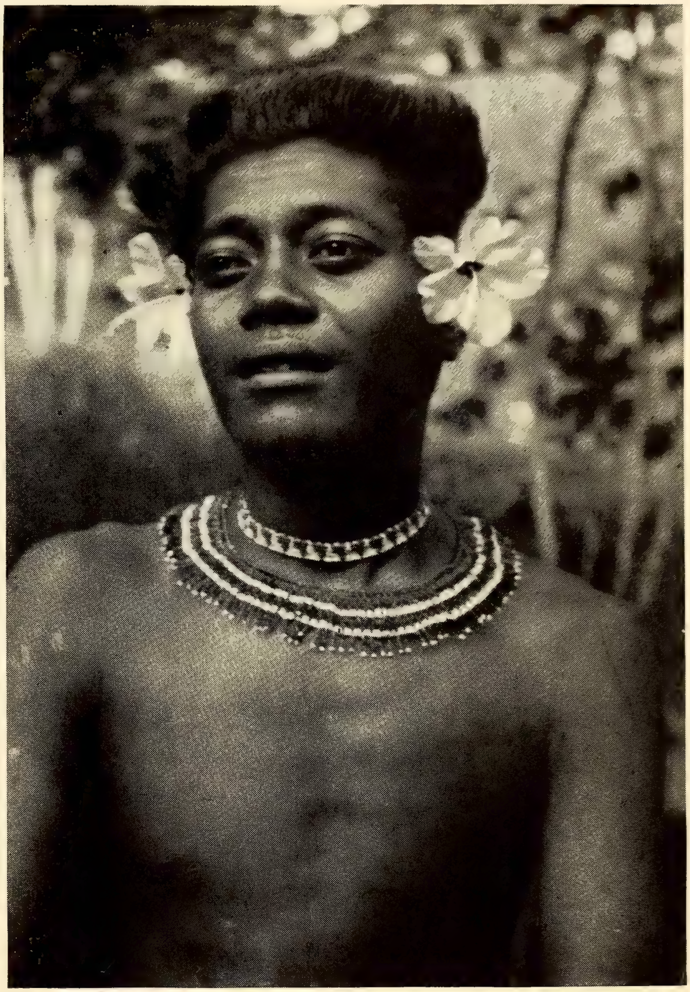
After the Australian navy had put an end to the spectacular career of the *Emden,* it reached out to strike the enemy in other places. German New Guinea was captured, and then a warship was sent to Nauru. The flag of the two-headed eagle was hauled down and the flag of the Crosses of Saint George, Saint Andrew, and Saint Patrick was hoisted. The German residents agreed to submit to British control. Then the warship steamed away. It was no sooner out of sight than the Germans, who had thrown their arms and ammunition over the reef upon her first appearance, broke their parole and hoisted their flag.

The next day a Japanese man-of-war, fresh from conquest of the Carolines and Ladrones, was sighted by the lookout on top of the wireless mast. The British flag was again hoisted and the warship steamed past without calling. A few days later the British flag was burned in a spectacular manner on the sports ground, after which the governor ordered all British subjects to go aboard a small cargo ship for deportation to Ocean Island.

These exiles, including women and children, about forty in number, reached Ocean Island the next day and were assigned homes with the company staff there. Ocean Island had no wireless at that time, so it was two months before the news could be sent to Rabaul, in New Guinea, the nearest point of military occupation, and measures taken to turn the tables upon the Germans.

A ship was sent, with officers and soldiers and a machine-gun. It called first at Ocean Island and took on board the deportees, who were carried back to Nauru. The Germans were arrested and deported to Sydney, where they were interned during the war and then sent to Germany. Their native wives and half-caste children remained on Nauru.

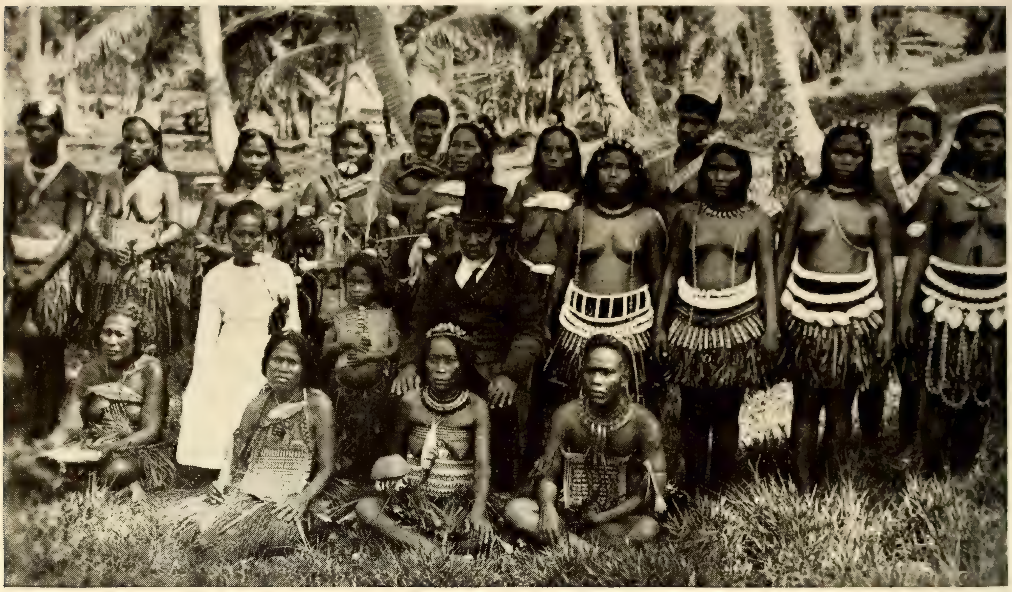
An Australian garrison was left, pending the duration of the war. A British administrator took the place of the German governor, and King George the Fifth



Photograph from Mrs. Rosamond Dodson Rhone

A BROWN-SKIN BEAU BRUMMELL

The men of the Solomon Islands, rather than the women, are clothed as "the lilies of the fields." They are particularly fond of wearing the brilliantly colored hibiscus in their hair.



Photograph from Mrs. Rosamond Dodson Rhone

A SOUTH SEA KING AND HIS LOYAL SUBJECTS

Before Nauru fell to Germany, it knew no white rulers, but was governed by its own immemorial laws, enforced by its own chiefs. King Aweida, he of the top hat, is surrounded by his subjects.

looks down from the wall today where Kaiser Wilhelm used to scowl behind his mustache.

A DOG REVEALS HIDDEN RADIO EQUIPMENT

An Australian wireless staff took over the plant on the hilltop and adopted a little dog left over from the German occupation. Whenever the members approached a certain pile of coral blocks on the rocky hill near the station the dog became excited, barking and attempting to dig, as if something were hidden beneath it. Upon investigation they uncovered the mouth of a natural shaft in the coral, at the foot of which caves opened. In one of these they discovered a quantity of material belonging to the wireless plant, which had been secreted by the Germans. The dog was named "Radio."

The German impress on the South Seas is not great. They left some fine wireless stations, some fine government residences, some botanical gardens; they left good roads. They left no colonies to speak of and their language made no impression.

One New Guinea governor stated that if during his tenure of office he was successful in teaching the natives to speak good German instead of English he would be doing good work, but this failed and all officials were obliged to give orders in pidgin English.

The German flag which was hauled down on Nauru was shown to me at Ocean Island spread out upon the veranda of the British residency by the commissioner of the Gilbert and Ellice Colony, to which the island belongs. He said (this was during the war): "I wonder if this flag will ever again float in the Pacific."

NAURU UNDER BRITISH CONTROL

Nauru has about twelve hundred natives. Early in 1918 the chiefs, who had been under German rule for twenty-eight years before the war and under British rule pending the war, came to the administrator and asked him to send a petition to King George the Fifth to keep the island and not let it be returned to Germany.

The administrator thereupon summoned all the natives, men and women, to appear before him and declare themselves British or German subjects. This

Photograph from Mrs. Rosamond Dodson Rhone

TEACHERS AND PUPILS OF A MISSIONARY NATIVE SCHOOL

was the first plebiscite growing out of the war, and it took place in what was perhaps the most remote territory in the world. It suggested that day in the Old Testament when Joshua called all the tribes of Israel to Shechem and said to them: "Choose you this day whom ye will serve!"

This was a great day for Nauru. Perhaps the crowd that gathered in Shechem on that far-off day was no more weird and picturesque in appearance than those who came together on this little coral island.

As upon a festal day, the natives crowned themselves with fresh wreaths of flowers, and those who were nearest to the white settlement or under missionary influence put on "plenty clothes," the men wearing clean lava-lavas falling to the knee and the women Mother Hubbard dresses reaching to their bare heels, while those from more remote parts of the island, or avowedly pagan, came dressed only in *ridis* of pandanus leaves, swinging from their hips like ballet dancers' skirts, their bare brown torsos glistening with coconut oil.

They came on foot, on bicycles—a native in a *ridi,* riding a bicycle is a delightful anachronism,—some of the aged and feeble were drawn in light carts by man (or woman) power. Perhaps the most picturesque figure in that company was an old man named Tekoroa, dressed in a mat wrapped about his waist and reaching to his knees, encasing him tightly, like an envelope. Before there was a white government he killed seven men, natives, cast upon the beach by the waves, in order to seize their canoe.

They assembled at the government court-house, which is built like a native house, a high, wide shed supported by posts of coconut timbers, roofed by a deeply eaved thatch of pandanus leaves and floored by coarse coconut mats. Guided by the native police, they passed in line before the administrator's desk and subscribed themselves, without exception, British subjects. They can all read and write in their own language, for the missionaries have spread education throughout the islands.

MINING AND SHIPPING OF PHOSPHATE

Phosphate is mined by Chinese coolies in open quarries, but these are not like stone quarries, where everything is taken out as the work progresses. The phosphate is packed between the coral pinnacles as tightly as the filling in a tooth and

Photograph from Mrs. Rosamond Dodson Rhone

THIS IS THE LIFE IN NAURU

Not the least of this island's attractions are the many beautiful lagoons into which coral rock pinnacles and coconut palms throw sharp reflections.

must be excavated, leaving the pinnacles standing.

There is, perhaps, no hotter working place on earth, for as the workmen descend, digging and blasting, they are below the level of the trade wind's cool breath and exposed to the fierce rays of the tropic sun.

When a coolie has filled a pair of baskets he hangs one on each end of a carrying-pole and makes his way by devious paths through the worked-out places to a central carrier, called the "flying fox," running on a cable. He dumps his baskets and trots back for another load, while the carrier conveys the phosphate to a hopper, a tall wooden tower with chutes, from which it is dropped into cars ready to take it to the dryers, huge buildings containing crushing and drying machinery and storage bins for the finished product.

A worked-out phosphate field is a dismal, ghastly tract of land, with its thousands of upstanding white coral pinnacles from ten to thirty feet high, its cavernous depths littered with broken coral, abandoned tram tracks, discarded phosphate baskets, and rusted American kerosene tins. Yet, in this waste, vegetation begins and young pandanus trees and sprouting coconuts are opening vigorous leaves and sending strong roots downward into the crevices of the coral.

To get an adequate idea of the expense and difficulty of equipping and maintaining the phosphate works, which include the maintenance of the employees, one must understand that the islands furnish nothing except coral rock and sand for rock and concrete foundations, and a little fruit and an abundance of fish for food. On Ocean Island even the use of sand is prohibited by the government, as there is very little sandy beach, the island being edged by vertical cliffs of coral. With this exception, whatever I say of Nauru is equally true of Ocean Island.

Even fresh water is lacking and must be provided by catchment areas for rainwater, the iron roofs of buildings serving this purpose, with galvanized iron tanks and concrete cisterns for storage, while

Photograph from Mrs. Rosamond Dodson Rhone

BUADA LAGOON, SHELTERED BY ONE OF NAURU'S COCONUT GROVES

The fish-pond partition in this lagoon is used by the natives as their live storage chamber for fish brought from the sea. It is covered with palm leaves.

sea water is used in the sewerage system and for the fire department. In case of lack of rainfall, and the Line islands are subject to severe droughts, fresh water is furnished by condensing sea water.

NO HARBOR IN NAURU

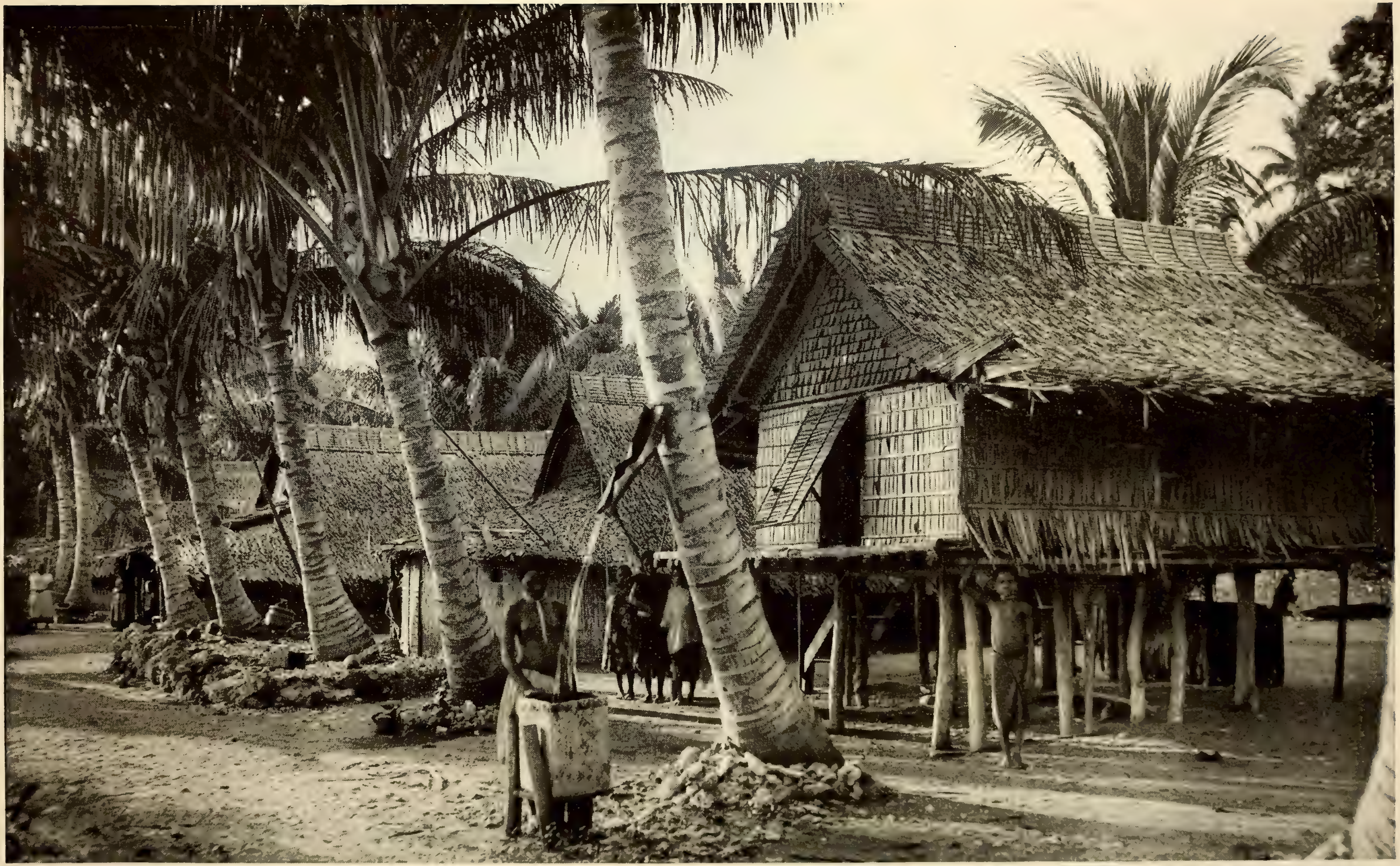
Every bit of wood, steel and brick for building and furnishing, every piece of machinery, all articles of clothing and food, are brought over 2,000 miles in ships from Australia. To the ordinary hazards of ocean cargoes is added the difficulty of unloading from rolling ships into tossing surf-boats. Sometimes the stevedore's gang misses the boat and drops a bulky piece of cargo, such as a piano, into the sea, when, even if it is salvaged, it retains a salt-sea tang on its wires.

There are low islands, atolls, that have practically no leeward side, but are all windward—that is, the winds blow right over them, and the sea on all sides is agitated so violently that it is not possible to land anywhere on their shores; there are others which have lagoons with one side open to the sea, through which ships can pass into safe harbors.

Nauru has no harbor, no anchorage, but she has a leeward shore, the western side, where, for the greater part of the year, ships can lie "off and on" sheltered by the bulk of the island from the winds which beat incessantly upon the windward side.

Formerly ships were obliged to lie "off and on," and some of them came too far *on* and were wrecked on the reef, but now there are deep-sea moorings provided by the phosphate company. Huge buoys lie on the surface of the sea, at a safe distance outside the edge of the reef, anchored far down beneath the surface and attached to the reef by "bridles"—chains bolted to the surface of the reef. The reef does not break off abruptly, but slopes beneath the sea at an angle of 45 degrees, so that 100 yards from the shore the water is 100 yards deep.

With infinite toil and patience these moorings are laid, as the mooring ship can work only in reasonably calm weather, and as soon as they are com-



Photograph by J. W. Beattie

CATCHING RAIN-WATER FROM COCO-PALMS

Fresh water is scarce on the guano islands and must be provided by catchment areas for rain-water. When a coconut tree has a good bend in it, the natives wedge the butt end of a coconut leaf into the knee, which collects and diverts rain-water into a receptacle. Galvanized-iron tanks and concrete cisterns are also provided for storage.

plete the sea endeavors to tear them loose. "White horses" is not a far-fetched figure of speech for the crests forever hurdling the deep-green waves. Like wild stallions bitted and bridled, they tear at the steel "bridles" of the moorings and lash out with thrashing heels at the buoys, while beneath the surface the steel cables are gnawed by salt water, and polyps load them with their fairy palaces of living coral.

When all the difficulties of mining, crushing, and drying the phosphate have been overcome and the loaded cars have been run out upon the piers ready to shoot their loads into surf-boats, there may come a "westerly"—that is, the wind may change and blow toward the shore. Then the ships, which always have steam up and watches kept, as if at sea, loose their moorings and go out to sea, where they drift about, waiting for the wind to change.

One ship made a record by drifting for three months while waiting a chance to take on cargo, coming up to the island daily to signal. At length she ran out of coal and a collier came up from Sydney to supply her, but as it was impossible to tranship the coal on account of the violence of the sea, the ship, with the attendant collier, proceeded to a lagoon in the Carolines, where she filled her bunkers.

LABOR RECRUITED FROM DISTANT ISLANDS

The two classes of laborers, the workers in the phosphate field and the loading crews on the cars and boats, include few natives of Nauru. The former, as we have seen, are Chinese coolies, the latter Kanakas recruited from other islands. A Kanaka is a South Sea islander. The word is a general term meaning *man;* but no islander applies it to himself or to men of his own island. He uses it as a term of contempt.

Every two or three years a ship is sent among the Marshalls, Carolines, and Gilbert and Ellice groups to recruit laborers and to return the Kanakas whose terms have expired.

The recruited laborer hires himself to the "company" not on account of wages, but as a chance to travel, to see the world. He is assured of food and shelter and, if he has a wife and family, is given married quarters. He looks upon the wage as "velvet," to be spent on such luxuries as gay lava-lavas made in Manchester, England; for tobacco, sugar, canned salmon, jewsharps, and accordions.

He takes life lightly, hilariously, and gets much amusement out of his employment. Not for him the arduous labor of the phosphate field—none will undertake that but the plodding "China boy"—but the rush and roar of the steam and trolley phosphate trains, the pitching and tossing of the surf-boats under the end of the cantilever, whose long steel arm reaches beyond the edge of the reef, as the phosphate is shot down through a flexible canvas chute into huge baskets, amid clouds of dust, usually reaching its objective, but sometimes spilling into the sea to the accompaniment of shouts and laughter.

With singing, shouting, yelling, the string of surf-boats is pulled by a motor launch out to the ship, one man standing in the stern of each to handle the long steering oar, his brown body, clad only in a lava-lava, glistening with coconut oil and his head and shoulders powdered with white dust.

With more shouting and laughter the baskets are caught up by the derricks, swung on board and dumped into the hold, sometimes missing and dropping their contents into the sea amid renewed merriment. If anything goes wrong with the derricks and the men in the surf-boats, rising and falling with the waves, are threatened with danger from above, they dive overboard to the safety of the sea, like frogs on the edge of a pond plunking into the water.

Sometimes the wind changes so suddenly that the ship is obliged to put out to sea in haste, and the surf-boats are caught before they are able to reach shelter in the small artificial boat harbor and are either swamped or driven upon the reef and thence hauled up on the beach (see illustration, page 561).

THE RELATION BETWEEN THE NATIVES AND THE COCONUT TREES

Nauru is about seven and a half miles long and half as wide and is shaped like an oyster. It is bordered by the reef, which is bare at low tide, and inside of which is a beach of white coral sand. The beach above tide level is covered

Photograph from Mrs. Rosamond Dodson Rhone

THE ROAD OF HEART'S DESIRE

A road bordered with coral makes the twelve-mile circuit of the island of Nauru, following the beach for the entire distance. Only the tropics could afford the vision of beauty of a bright moon shining from a cloudless sky through the feathery fronds of the coco-palms.

with coconut palms, interspersed with pandanus and other trees and shrubs.

Back of the coconut plain rises a palisade of tall coral pinnacles whose summit is the phosphate plateau, which is covered by a forest of evergreen trees, the most common one being the tamanu (*Calophyllum inophyllum*), with handsome deep-green leaves, resembling laurel, and flowers like orange blossoms.

In the center of one end of the island is a small lagoon surrounded by a coconut grove. The broad plateau is uninhabited, as the natives live only under the coconut trees.

The tie between the South Sea islander and the coconut tree has been dwelt upon by travelers; in fact, in the Nauruan legends the coconut itself either owes its eyes and mouth to human ancestry or man owes his eyes and mouth to the coconut—the legend is hazy in outline. Certain it is that it is the most precious gift of the gods to the dwellers on the coral isles, and where it does not grow, there are no inhabitants.

The green nut furnishes drink and a delicate meat like the white of a soft-boiled egg. The ripe nut furnishes the copra of commerce, food for man either raw or grated and mixed with other foods, as well as food for fowls and pigs and fish bait. It provides oil for the hair and skin, an essential part of the native's toilet. The dried and polished shells make water bottles and oil flasks.

The fiber which surrounds the nut in the husk is twisted into cord, sennit, used for every purpose where cord or rope is needed, from binding together the rafters and posts of huts, the timbers of canoes and palings of fences, to tying sharks' teeth upon spear blades and making bird cages and fish-nets.

The sap dripping from the severed flower stalk is sweet toddy, which fermented becomes soma toddy, an intoxicant. The unopened leaves in the crown of the tree make a delicate white salad, the "sailors' cabbage" of the old whaling days. As this can only be obtained by killing the tree, white people call it "millionaires' salad," owing to the valuation of trees.

The sheath at the base of the leaf (stipule) resembles a coarse sacking and is used for wrapping the grated meat in the crude oil press. The leaf makes an outside layer for the thatch, a coarse basket, broad coarse mats for the floor and for hanging on the weather side of huts. The midrib is used for fence palings and house walls. The dried leaves are bunched together and tied with green ones for torches. A strip of leaf bound around a tree trunk acts as a gutter for rain-water and a piece of leaf attached to the trunk in a certain way is a trespass notice.

The trunk of the tree is used for posts and rafters of huts, the shafts of spears, and dug-out canoes.

WEALTH IS MEASURED BY COCONUT TREES

Wealth and rank are gauged by coconut trees. To own much coconut land is wealth and aristocracy; to own none is beggary; in the old time it was slavery. Some men have made a good thing, as reckoned in the islands, by marrying brown brides rich in coconut land.

Photograph from Mrs. Rosamond Dodson Rhone

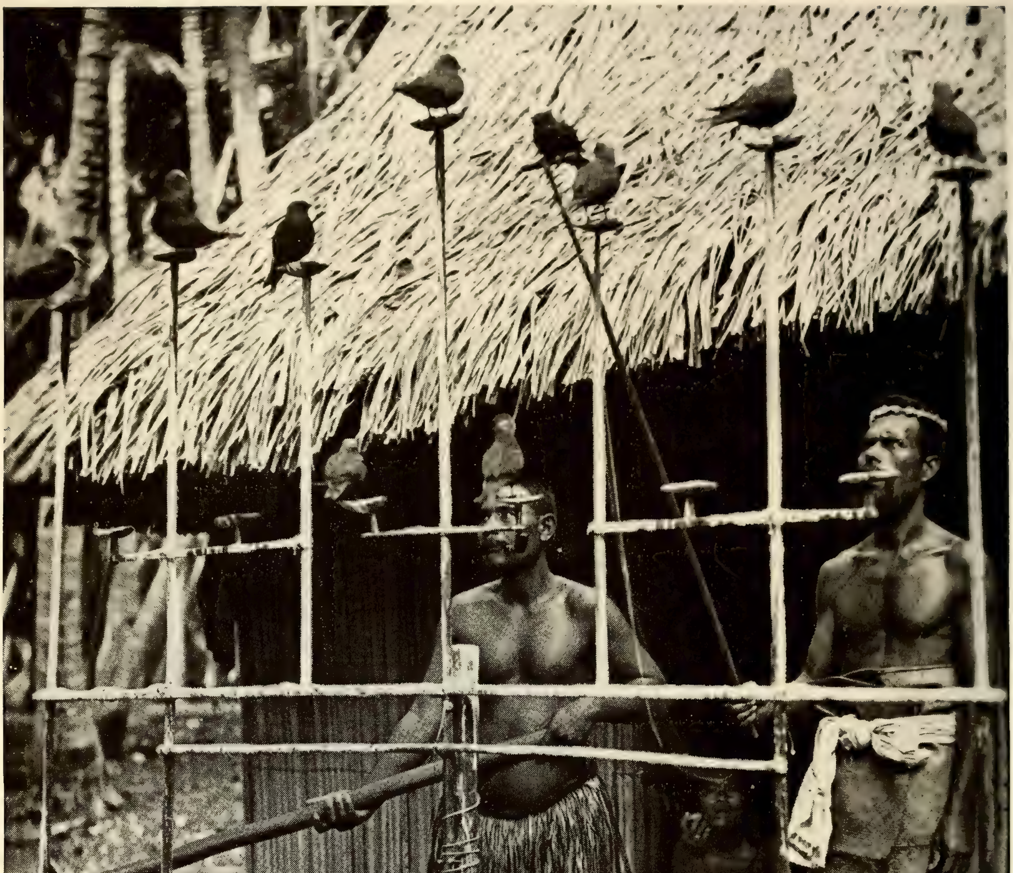
NATURE TRIUMPHANT AMID THE CORAL PINNACLES OF NAURU

A worked-out phosphate field is a dismal tract of land, with its thousands of upstanding white coral pinnacles from ten to thirty feet high. Yet, in this waste, vegetation begins and young pandanus trees and sprouting coconuts are here seen opening their vigorous leaves after having sent down strong shoots into the rock crevices.

The land is cut up into very small plots, usually described by square rods and roods instead of acres. The title to the trees does not pass with the land, but is a separate transaction. You may buy a piece of land, but cannot use the nuts, and the native owner has the right to come upon your premises to gather toddy and nuts.

The present valuation of the trees is from one pound sterling each for bearing trees to one shilling each for properly planted young trees. The first British administrator on Nauru did not know this, and when he cleared a piece of government land for a cricket ground by cutting down 80 trees, the native owners asked and were paid 80 pounds.

The trees are not only reckoned by count, but the nuts are reckoned by count. In normal times the crop is continuous, blossoms, green and ripe fruit being on the tree at the same time.



Photograph from Mrs. Rosamond Dodson Rhone

THE NAURU ISLANDERS ARE DEVOTED TO THEIR PET TERNS

Known as "noddies," these birds of sooty body plumage and gray heads, classed with the "booby" because of their unusual stupidity, are pets of the islanders. Their eggs are collected for food.

In time of drought the natives are not permitted to make copra, as the nuts are needed for their own food and for seed.

From 1914 to 1917 there was a great drought which killed thousands of trees. When the rains came and the trees blossomed, the natives asked permission to make copra. The administrator ordered a census of the ripe coconuts, and he went in person all over the island and verified the count. The natives count quickly, by tens. Each heap contained so many hundreds. He found the total barely sufficient to sustain the population until the new crop ripened, so forbade the making of copra.

THE PANDANUS TREE GROWS ON STILTS

The gods have given to the islanders another tree almost as valuable as the coconut and constantly associated with it. The screw pine, pandanus, is an extraordinary tree, dependent upon crutches and stilts. It starts in life as a stemless plant, closely resembling yucca, with sword-shaped leaves, each fitted on its edges and midrib with sharp spines. A little later it sends up a stout spiked trunk to about ten or fifteen feet, crowned with leaves like the radical leaves. It now resembles a huge mop.

Should the trunk be bent from the vertical, the tree drops from the top a cord with a bud at the end protected by a sheath; when it reaches the ground the sheath decays, the bud roots, and the stiffened cord becomes a crutch. A set of stout, bracing aërial roots is thrust out from the lower part of the trunk, the radical leaves decay and leave the tree standing upon stilts.

A straight horizontal branch is often thrust out at a height of two or three feet from the ground, sustained by roots set at an angle on each side, resembling a rustic bench, but any attempt to use it as a bench is speedily abandoned, as it is set with stout spines. The tree grows thus with stilted roots till it covers a large tract of ground.

Pandanus leaves are used for making *ridis,* fine mats and basket weaving, for thatching huts, for calking canoes, and for many other things for which coconut leaves are too coarse. The tree bears an orange-colored globular fruit, the size of a foot-ball and larger, separable into sections, which are chewed for the flavor, as it is composed of fiber and flavor only. It is also stewed and the juice made into a palatable black paste.

SCRAP IRON USED FOR FERTILIZER

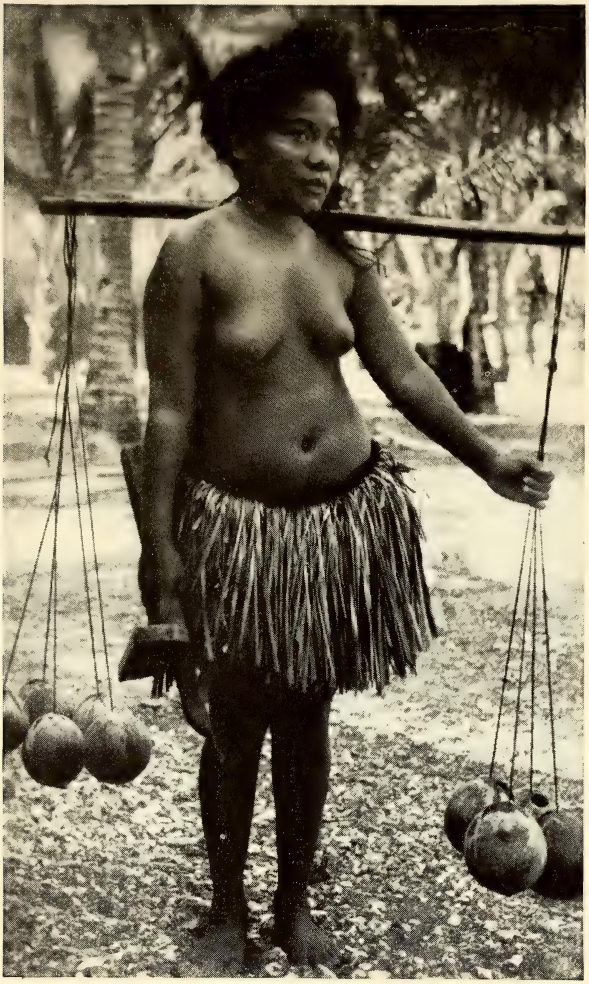
The coconut tree being of such supreme importance to him, one would think the native would cherish it as his wife and child, but, on the contrary, he gives it no attention whatever, for it grows without care and lives to a great age. If he wishes to plant a tree, he picks out of the heap a sprouted nut, whose flattened triangular husk and opening leaf, standing at right angles to the long petiole, resemble the body and head of a duck, sets it into a shallow hole in company with a piece of old iron, and leaves it uncovered.

The proper planting of trees is done in the same way, except that the holes are wide and deep and placed at regular distances. Iron rust is beneficial to young trees. The nuts are not covered with earth for a year.

In 1897 a scientific expedition from Sydney landed on the island of Funafuti, in the Ellice group, in order to put down a bore to ascertain the depth of coral. This was to test the theory of the formation of atolls as announced by Darwin, who had said that it could be settled by a core from a depth of 500 to 600 feet.

There had been a British expedition at Funafuti the previous year, which had been abandoned on reaching a depth of 100 feet, owing to the breaking down of the machinery. The engineers had brought back a story of the difficulties in boring coral; that zones of extremely hard rock alternated with those of sand; that often the drill would strike a cave, where it would twine around in space and perhaps be lost in the depths.

It was with a good deal of trouble that money had been found for the second expedition. The government of New South Wales had furnished part, and private contributors the remainder, so that the little party felt that much depended upon their success. They began drilling and were only well started when a crown bevel-gear wheel broke and the boring stopped, as there was none to replace it. They stood around the drill in despair. There would be no ship calling for three months; there was no cable or wireless



Photograph from Mrs. Rosamond Dodson Rhone

DEMONSTRATING ONE OF THE MANY USES OF THE COCONUT

Water-bottles and drinking-cups are made from the shell of the ripe coconut. The flesh is scooped out through the eye end of the nut and the outer skin ground off. Presto! a water-bottle, with a twist of leaves for the cork. Cups are polished with the nut oil and become ebony-colored with usage. The girl holds in her hand a coconut grater for making "anakiwi." She sits on the handle and works the coconut back and forth over the metal beak.

communication with the outside world; they were marooned on a tropic isle, whose discomforts and limitations they had discounted for science's sake, but which loomed in importance with the threatened failure of the expedition. A native stepped out of the crowd of curious islanders, whose bare bodies made a brown ring around the little group of white men, and, pointing to the broken wheel, addressed Professor David, the head of the party, in pidgin English:

"He no good?"

"No good!" was the reply, with a despondent shake of the head.

"One all saime belong me!" said the native.

"Belong you?" said Professor David in amazement. "What do you do with it?"

"Me plant him in coconut tree. You look see?"

The engineers did "look see," for the native dug up the twin of the broken wheel, which had been left behind with the discarded machinery of the previous expedition. It was put in place and the drilling went on. Mrs. David, who wrote what she calls "An Unscientific Account of a Scientific Expedition," has in her book a photograph of the "fertilizing wheel."

"A VEGETABLE GIRAFFE"

At first a coconut tree appears rather silly and inadequate. Mark Twain labeled it a feather duster on a long pole; Stevenson called it a vegetable giraffe, "so graceful, so ungainly."

We are so accustomed to think of a tree as having a solid vertical trunk, diminished regularly by branches, balanced and clothed with leaves, that a coconut palm hardly resembles a tree. It is bare to the top, tapering very slightly. I sometimes think of those sinuous trunks as ropes attached to captive balloons swaying in the wind. A fallen trunk ringed with the marks of decayed leaves looks like a great gray hawser; and yet this inadequate-appearing trunk suffices to sustain a tuft of leaves each ten and fifteen feet long and huge bunches of nuts eighty to one hundred feet in the air.

The coconut grove, seen from its edge, as one approaches from the sea, with its pale-gray slanting trunks and level tops, is without dignity and rather disappointing; but seen from within, the trunks become light, graceful pillars, the feather dusters become a roof of green, rustling thatch, the deep shade is a grateful shelter from the tropic sun; or, looked down upon from a hilltop, the massed crowns, moved by the trade wind, flash in the sun like drawn swords. From beneath and from above, the grove is stately and dignified and when the moon gleams are flashed from the great fans the heart swells with rapture.

It is a pleasure to penetrate the slender-pillared aisles, to hear the trade wind clashing the leaves high overhead, to follow the numerous narrow footpaths printed by bare brown feet.

The grove is not a solitude, but is the dwelling-place of the brown people of the island. Their huts stand all through the wood, but the gray thatch and mat-hung walls so melt into the boles of the palms that they are unobtrusive, and the people walk so lightly on their bare feet that they make no sound. It is startling to catch a slight movement in the shadows and see a group of men making a canoe; or to gaze into one of the brown pools of brackish water and see looking up the brown face of one of the maidens who is taking a bath; or to see on the edge of the grove a line of brown figures, with *ridis* swinging from hips, and bunches of drinking coconuts and a huge fish swinging on poles between them, silhouetted against the crimson sky.

Photograph from Mrs. Rosamond Dodson Rhone

DEBUTANTES OF NAURU

The Nauruans are a handsome race, the women being accounted the best-formed of the Pacific Islanders. They are very friendly in their greetings to strangers. Their abbreviated *ridis* are made of pandanus leaves.

The huts are furnished with nothing at all. Sometimes the floor or part of it is a platform, raised three or four feet; usually it is the ground, strewn with broken coral, covered with mats, on which the dwellers sit by day and sleep at night. There may be a Chinese camphor-wood chest, a clock, a lantern, a bicycle; there are always bottles of coconut oil and coconut-shell water-bottles hanging under the eaves.

The yard is walled by a line of coral a few inches high, like the play-houses we built when we were children, and it is often surfaced with clean white coral shingle from the beach.

Close to the hut are the graves of the household, sometimes inclosed by palings, but often merely outlined by coral or inverted beer bottles.

CIVILIZATION AND CLOTHES BROUGHT DISEASE

The cooking is done on the ground, outside the hut, and is very casual, for much of the food is eaten raw; raw fish, raw shellfish, and raw coconut are staples. When food is cooked it is generally burned outside and half raw within.

Photograph by R. J. Baker

A TRITON OF THE PACIFIC

All through the Pacific islands the native races are dying out, owing to their contact with the white races. Many observers attribute their susceptibility to the diseases of civilization to the fact that they have begun to wear clothes (see text, page 583).

The native dress for both sexes is tasteful and becoming and suited to the climate. It is a full skirt made of narrow strips of pandanus reaching to the knees. A wreath of fresh flowers and a necklace of flowers or beads complete the costume. Sometimes the necklace is strung with shark's teeth and finished with a pair of frigate-bird feathers, which hang down the back.

The men often wear a belt, in which is thrust a huge, wicked-looking coconut knife.

Although these people are almost nude, they do not appear naked; the brown pigment clothes them, and they are as unconscious and poised as we in our clothing. They have well set-up figures and walk with the ease and grace of persons who have never worn corsets or shoes. They have fine teeth and straight, black hair, that of the men cut short, while the women wear theirs streaming down the back or hanging in braids.

Owing to the influence of civilization, they sometimes substitute for the exquisite wreaths of natural flowers the pink celluloid combs sold by the trade stores, and the men wear extraordinary earrings, such as safety-pins and matches.

In the "good old days"—every country has its "good old days," and in the South Sea islands these were the days before civilization impinged upon native customs—the natives anointed themselves frequently with coconut oil. After coming in from the fishing canoes, after violent exercise, and always before sleeping, they applied the oil freely. This safeguarded them from colds.

When they began to wear clothing they found that the oil stained their clothes, so they abandoned its use in great part.

All through the Pacific the native races are dying out, owing to their contact with the white races, whose diseases have proved extraordinarily fatal to them. So simple a disease as measles has almost destroyed the population of many islands. Tuberculosis is prevalent and Spanish influenza wrought great havoc.

Not the least cause of this is the wearing of clothing. The natives wear their clothes day and night. If they are wet by rain or by wading in the sea—I have seen them immersed to their shoulders while casting nets on the reef—they do not change, for in that climate they feel no sensation of cold, and even sleep in wet clothing, instead of oiling their bodies as formerly.

Many thoughtful observers hold that the influence of dress, especially the dress of women, has worked harm, for while the natives have learned to wear clothes, they have not learned how to wear them. Robert Louis Stevenson, who has much to say in praise of missionaries, says this about clothing:

"The mind of the female missionary tends to be continually busied about dress. She can be taught with extreme difficulty to think any costume decent but that to which she grew accustomed on Clapham Common, and to gratify this prejudice the native is put to useless expense, his mind is tainted with the morbidities of Europe, and his health is set in danger."

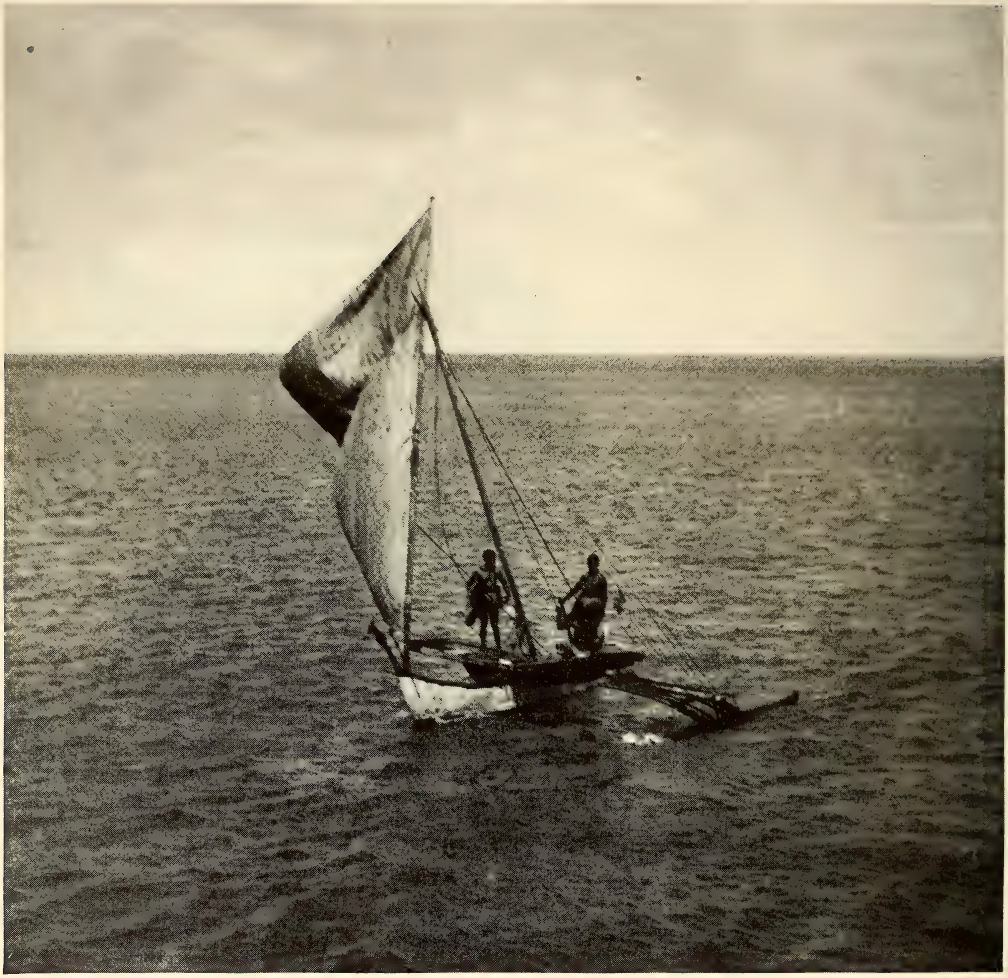
THE "MOTHER HUBBARD" IS ESPECIALLY UNSIGHTLY IN NAURU

The "Mother Hubbard" dress, the universal attire for women, is ugly, especially as worn in Nauru, reaching from throat to heels; in the Gilberts it is modified by being cut square in the neck and shortened to the knees. Fortunately, the missionaries stopped before they put hats and shoes on their converts.

A native woman does not feel herself modestly attired without the *ridi;* she often wears it under her dress, where you can see it bulge and hear it rustle. The missionaries devised a much more suitable dress for the men. The lava-lava, two yards of cotton cloth wound around the loins, tucked in at the waist and falling to or below the knees, and a white "singlet," a short-sleeved gauze undershirt, is simple and becoming. The *ridi* is frequently worn beneath the lava-lava for modesty's sake.

A large proportion of the Nauruans dress in purely native costume; others wear clothes to church or in the homes, where they are employed as servants, and change for *ridis* when they return to their homes; and yet others wear clothes without change till they fall into rags, or, as they say, "broken clothes."

The natives keep pigs, which run at large. "Captain Cook's pigs" they are



Photograph from Hugh M. Smith

NATIVE CRAFT WITH ITS SAIL TIED UP TO "SPILL" A TOO-FRESH BREEZE

One of the characteristic devices of this boat is the outrigger, a piece of wood sharpened at both ends and fixed parallel to the length of the boat, which stabilizes the craft and even permits open-sea sailing without materially decreasing its speed.

called throughout the Pacific, as he is supposed to have introduced their progenitors.

One of the governors ordered all pigs penned. The owners built pens and put the pigs inside, but neglected to give them food and water, as they had never been in the habit of giving them any care, and they began to die; so the order was rescinded. The pork is delicious, as the pigs are fed exclusively on coconuts.

The natives also keep peculiar-looking chickens. The roosters have small bodies and abnormally long legs, so that they appear to walk upon stilts, while the hens are very small and lay small brown eggs. If this is a case of reversion to type, the rooster being descended from some long-legged ancestor and the hen from some tiny one, and if the tendency continues, there will come a time when the rooster will stand so high on his stilted legs and the hen will be so small and so far below him that they will not see each other at all.

The natives do not eat eggs, and the hens rear their broods unhindered, unless the owner desires to "catch shillings" in the white settlement, when he gathers all eggs that have not actually hatched and offers them for sale.

Tame frigate-birds are kept on large roosts close to the beach, and a favorite sport is catching the wild birds, using the tame ones as decoys; they are lassoed by a weight on the end of a fish-line. The children play a game in imitation of this, in which the bird is a pair of feathers weighted in the middle.

The birds which are not fully tamed are tied to the roost by long lines and are fed daily, just before sunset, with pieces of fish. The owner tosses the fish into the air and the birds swoop down and catch it. The native gives his pet water by squirting it out of his mouth, as the Chinese laundryman used to sprinkle clothes (see illustration, page 578).

FEW GODS IN THE ISLAND'S MYTHOLOGY

The native myths are not populous with gods, like those of richer lands. They say, in common with those of the other South Sea islands, that the sky originally lay flat upon the earth, and men wriggled beneath it prone upon their faces; when it lifted a little they went stooping; when it was finally hoisted to its place by the Spider, they stood upright. The first men were immortalized by being changed into coral pinnacles.

There appears to have been no organized priesthood, but an altar formerly stood before the hut of each chief, upon which were laid offerings of food, either devoted to gods, to the ghosts of their ancestors, or, what is more probable, to devils, in whom the natives have profound belief.

As late as 1889, a man-of-war called at the island and the sailors desecrated one of the altars by seizing the coconuts and other food upon it. The ship steamed away to Apia, in Samoa, was caught in the great cyclone on Saint Patrick's Day of that year, which destroyed most of the shipping in the harbor, including six warships, and was wrecked. The sacrilegious sailors were drowned. The Nauruans look upon this as a punishment by the spirits.

Some of these altars, which were coral pinnacles the height of a table and higher, are still standing, but are not used save as indications of the chiefs' houses. The government is substituting "chief posts" with the names of the chiefs inscribed.

The last of the witch doctors is still living, but the court has put an end to her practice. A native, whose abdomen was vastly distended by dropsy, sought her for relief. She took a woman's weapon, a short, stout handle with a head beaked with a shark's tooth, and ripped open the abdomen. The dropsy was cured, but the patient died, and the doctor was tried and convicted of murder and sentenced to life imprisonment in the house of the head chief, where she may be seen any day sitting on the mats in company with the chief's family.

AN ISLAND LYING IN LONELY SEAS

Nauru lies in lonely seas. There are three steamship routes between America and Australia, but the nearest one crosses the Equator about 1,400 miles to the east, on the way from Honolulu to Sydney; the steamship lanes across the Pacific from east to west lie about the same distance to the north; those from Sydney to Hongkong about as far to the southwest. Once in three months a small steamer plying between Sydney, the Solomon Islands, and the Gilbert Group, trading in copra and carrying a few passengers, touches at the island.

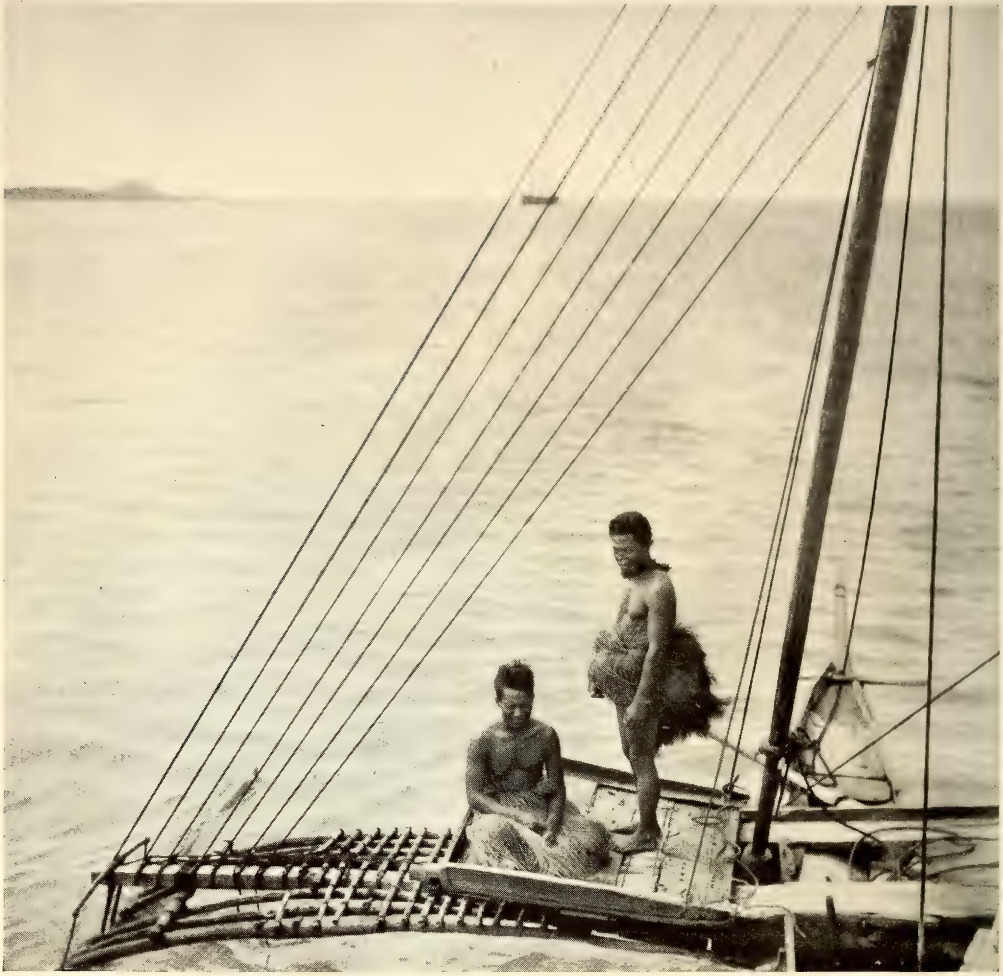
The mission ship, *John Williams,* carrying missionaries of the London Missionary Society to and from their stations throughout the Pacific, calls once or twice a year. The Pacific Phosphate Company's cargo boats, which come up from Australia every three or four weeks, are the main connection with the outside world. They carry mails, supplies, and a few passengers.

Time is not reckoned by the calendar, but by the arrival and departure of boats. The weather is never a topic of conversation, but the coming of the next boat is a vital subject.

TROPICAL HOUSEKEEPING

There are about 80 white residents. The greater number compose the "white staff" of the phosphate company—managers, clerical force, medical officers, engineers, overseers, and storekeepers. A garrison of a dozen men with a commissioned officer, a wireless staff, an occasional visiting missionary, the agent of the steamship company, whose boat calls four times a year, and the administrator, with his clerks, customs and post-office officials, make up the remainder.

Housekeeping has difficulties peculiar



Photograph from Hugh M. Smith

A SAILING CANOE AND ITS CREW IN PRIMITIVE COSTUME ON JALUIT LAGOON: MARSHALL ISLANDS

Jaluit, the chief island of the Marshalls, is an atoll with fifty islets on a reef. The lagoon around which these islets are grouped has a depth of 25 to 30 fathoms. Under Germany, Jaluit was the seat of government of the Marshall Islands and Nauru was assigned to that group, although the latter was 300 miles away and had its own language and distinctive customs (see text, page 561).

to the tropics. The houses of the white settlement are built of one thickness of boards and roofed with galvanized iron. The partitions stop about six inches below the ceiling, leaving spaces for ventilation. Wide verandas surround the houses, and these are the true living-rooms. The cook-houses are detached.

There are no wire screens. The almost constant trade winds keep away flies, but cockroaches as large as humming-birds fly in and out, and moths, lured by electric lights, dart against the ceilings. There are beautiful sphinx moths, which are caught by the natives, tethered by threads tied to their proboscides, and worn as ornaments upon their heads or shoulders.

Lizards, which scramble over the ceilings stalking flies, occasionally lose their footing and drop upon the head of any one beneath them. Rats make runways of the ventilating spaces; shore-crabs ravage gardens unless they are surrounded by crab-tight fences, and armies of ants attack cupboards and refrigerators unless they are defended by having their feet set in cups of water, which in turn must be covered with kerosene to prevent the breeding of mosquitoes.

All food is sent to the tropics in sealed tins, but as soon as they are opened weevils get in and work destruction. Every bed is fitted with a mosquito net, which must be cleared of mosquitoes that hide in its folds, before it is securely tucked under the edge of the mattress, if one would enjoy sleep.

THE SERVANT PROBLEM IN THE SOUTH SEAS

Wages are low; a native boy (all men employed as servants or in any capacity are "boys") can be hired as cook for one pound a month; a house boy for fifteen shillings; a laundress, who brings one or two helpers and works two days a week, receives one pound a *month.*

The servants are fed where they work, but sleep in their own huts. These native servants are like white ones, in that some are good and some bad. The good ones are treasures—faithful and honest. One conceives the same affection for them that the masters had for the negro house servants before the Civil War, but the best of them do not work like white servants. They need continual oversight for the sake of cleanliness and economy. House-cleaning, for instance, is conducted with a great deal of noise and splashing of water, but only the high places are touched, and if the cook finds a supply of dish-towels he throws away the soiled ones with the remark, "plenty more."

The reader can see that residence in the tropics is not one grand, sweet song; that one does not merely open one's mouth to let fruits fall into it; but, notwithstanding these drawbacks, it has its agreeable side.

OCEANICA'S ISLES DE LUXE

The master of the moorings, a man who has spent thirty years in the islands, is in the habit of saying, "The first ten years are the worst." Nauru and Ocean Island are really isles de luxe, for they have electricity for power and lighting; a refrigerating plant filled with beef and mutton supplied by live cattle and sheep brought up from Australia by each boat. Other advantages are a bakery, steam laundry, and plumbing with salt- and fresh-water shower-baths.

None of the other small islands has these luxuries; but, even without these, there is the charm of waving palms; of the shining beaches with their windrows of shingle, in which one gathers shells and coral; of the sea breaking on the reef; of the native huts glimpsed through the trees; of the white terns flying low and screaming; of tall herons wading in the shallow water at the edge of the sea; of the white clouds driven rapidly over the island by the trade winds; of the fleet of outrigger canoes sailing out at dawn or silhouetted against the setting sun as they return.

The climate is hot, but is tempered by the trade winds. For six months I watched the temperature range between 78 and 86 degrees; it rarely exceeds 90 degrees in any season. The sunshine in the middle of the day is blinding and scorching hot, but in the shade one suffers less than on many July and August days in the latitude of New York, in spite of the extreme humidity. About 4 o'clock in the afternoon the heat of the sun's rays becomes moderated and the evenings are delightfully cool.

SUNRISE AND SUNSET AT SIX THE YEAR ROUND

The sun rises at 6 and sets at 6 the year around; there is no daylight-saving there. The only change of seasons is when the "westerlies" come in the rainy season. These tropical rains descend with great violence. In the year following the three years' drought, previously mentioned, there was a rainfall of 150 inches, 10 inches falling in one night.

The violence of the wind resembles that of a blizzard, except that it is warm; but this is not a hurricane. The Line islands are not in the hurricane belts, which lie to the north and south of the Equator.

There is never any fog on these warm seas, and the brilliance of the moon and stars is unknown in the north. The pointers of the "Great Dipper," as it swings around in the heavens, are forever pointing to the Polar Star, forever out of sight below the horizon, and the "pointers" which mark the position of the Southern Cross are forever pointing

Photograph from Hugh M. Smith

COMMERCE CRAWLS APACE IN THE CAROLINE ISLANDS ADJACENT TO NAURU

The shed houses a fisherman's seine and the rickety stand holds the weight of his season's crop of copra, which he is trusting to the sun to get into a properly marketable condition for him.

at that rather feeble constellation, lying in the south.

The brilliance of the sunsets is beyond words; sometimes the whole sky is laced with streamers of crimson, changing to softest amethyst, with which the sea and the beach are tinted, while level bands of aquamarine stretch across the horizon behind the glowing streamers of color.

AMERICAN WHALERS INTRODUCED A PIDGIN LANGUAGE

Nauru has its own language, which is not understood by other islanders. In common with all the Pacific tongues, it abounds in vowels, each of which is pronounced, so that a native talks with the mouth wide open.

In the intercourse between the American whalers and other white men in the Pacific and the natives, a quite workable language has been evolved, which is known as pidgin, *bêche de mer,* or beach la mar. Its foundation is probably Chinese pidgin, but it is full of words common to the islands. *Kai kai,* for instance, is the universal word for food; it is also the verb *to eat;* it is used humorously by white residents, who invite their friends to *kai kai.*

Belong, pronounced b'long, is in common use. A native does not say "My brother"; he says, "Brother belong me." You do not say, "What is your name?" You say, "What name belong you?" You do not send a servant to the store to *get* groceries; you send him to *"catch"* sugar, flour, etc.

Bullamacow is the word for meat—either live cattle or canned meat of any kind. This is said to have arisen from the misunderstanding of their names by the natives when a bull and a cow were landed on one of the Samoan Islands.

SOCIAL LIFE AMONG THE WHITE RESIDENTS

While society is small, it is an interesting little group of people, who are familiar with South Africa and India, who know the "Never, Never" of Australia and the mountains of New Zealand, and who always call the British Isles Home with a capital H. Their sons fell at Gallipoli and on the Marne, but they carry on.

Beer and skittles is a fact and not a mere saying. Skittles is played with nine pins, in a bowling-alley which had originally a long German name. Cricket is played, and tennis, and dinner parties are given with the formality of similar functions in civilized lands, save that the table is served by barefooted servants in lava-lavas, with wreaths of flowers on their heads, and there are dishes which are unknown to temperate climes.

Here one enjoys such food as the coconut-crab, or robber-crab, which climbs coconut palms for the fruit, lives in holes in the ground, and resembles a lobster in appearance and flavor; crayfish which are similar to those of the California coast; a great variety of fish, which are brilliant in color and delicious to the taste; the *pawpaw,* or mummy apple, a fruit which resembles a melon, but grows on a small tree; and sour sop, a variety of custard-apple which has a soft, white, subacid pulp, tasting like a fruit salad *with whipped cream.*

During the war there were many small functions for the Red Cross, as well as a play in the theater where the audience sits under the stars, and several fairs to which the natives contributed their shillings. In one of these there was a native market, managed by the chiefs, where pigs, chickens, and coconuts were sold for the cause.

> "There's a schooner in the offing
>   With her topsails shot with fire,
> And my heart has gone aboard her
>   To the Islands of Desire."

What does it matter if the schooner is pervaded by the rancid odor of copra and populous with cockroaches, if natives traveling from one island to another share the deck space with the sheep and pigs? They are still Islands of Desire. The charms of the South Sea are real. Those who know them best love them most, and they gladly return from holidays spent at "Home" to take up island life with its limitations.

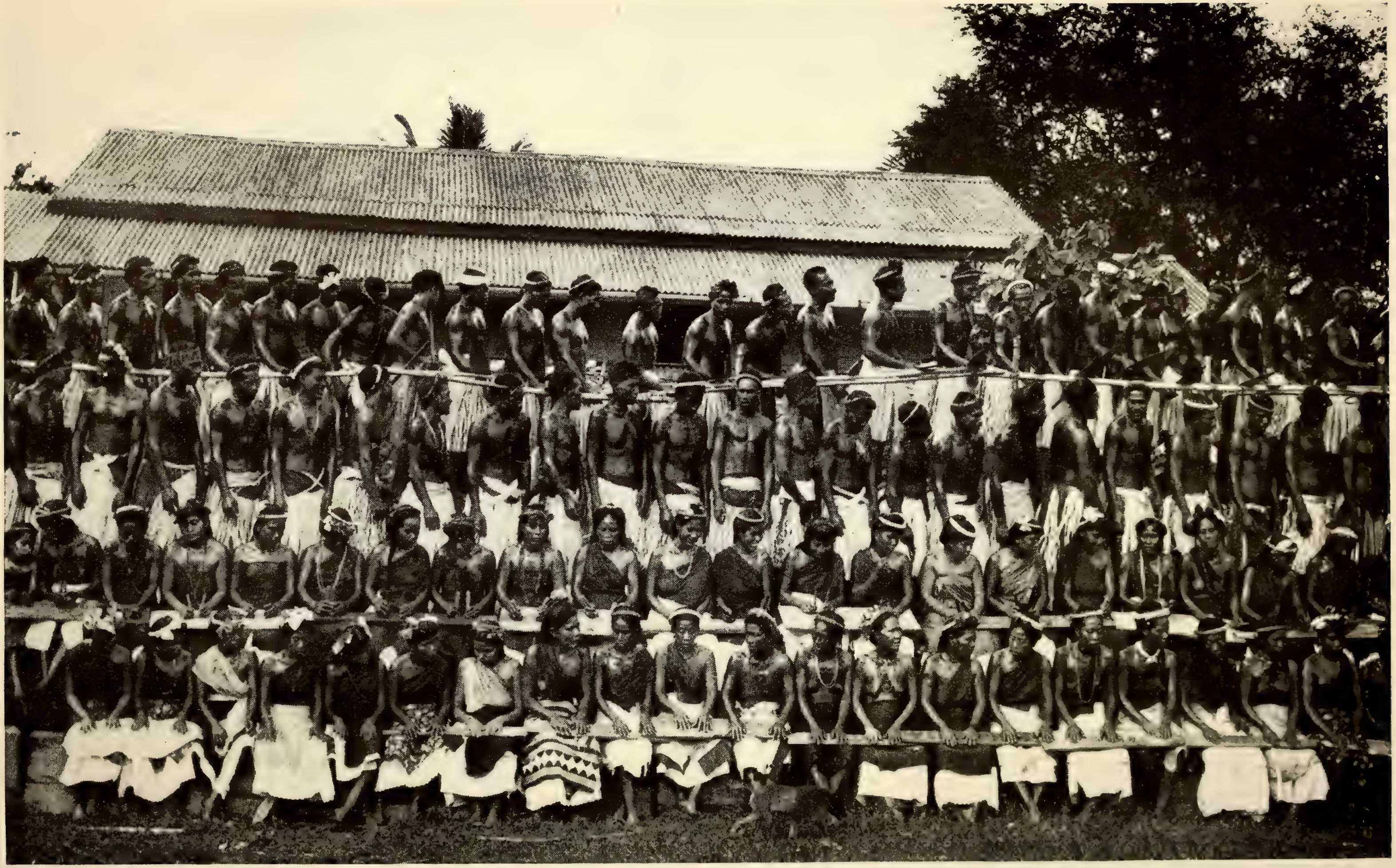
"A WIDE OCEAN, BUT A NARROW WORLD"

Would you like to do that, to cut loose from society, from convention, from civilization itself, and to sail and sail and sail, dropping familiar shores and landmarks; dropping the North Star, around which the whole familiar world revolves, around which history revolves—there is little history below the Line—and finally to make a landfall on a coral isle where coconut palms wave their shining fans above the dazzling beaches and gentle brown savages gaze curiously at the visitors? It has been done many times; the palms are there, the brown people are there, but they no longer look upon white men as gods descended by the rainbow bridge from the heavens; they have been disillusioned.

But let no one be deceived into believing that because these tiny islands are so remote, so lost in the sea, and society upon them so limited in numbers and so cut off from civilization, that one could flee to their lovely shores with the proceeds of crime, either stolen wealth or a stolen bride, and live an idle, luxurious life with the past safely concealed.

"The Pacific is a wide ocean, but a narrow world." Intercourse is not frequent, but it is constant; everybody knows everybody else, from Jaluit to Tonga, from Papeete to Port Moresby. Civil servants, missionaries, ship masters, traders keep up a system of communication that puts Marconi to shame, and just as in a small village gossip is more rife and uncharitable than in a large town, so it is in these small island communities.

Notice of change of address of your Geographic Magazine *should be received in the office of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your January number, the Society should be notified of your new address not later than December first.*



Photograph by Junius B. Wood

A FEW OF THE TWO HUNDRED PERFORMERS IN PONAPE'S NATIVE DANCE

The men wear short fiber skirts, wreaths of flowers around their heads, and many strings of beads, while the women's costumes are as varied as a Fifth Avenue fashion show. The bodies of all the dancers, having been rubbed with coconut oil, glisten like polished bronze.

YAP AND OTHER PACIFIC ISLANDS UNDER JAPANESE MANDATE

By Junius B. Wood

With Illustrations from Photographs Taken by the Author in the Spring of 1921

LIFE is easy and time drifts slowly by on the little tufts of green in the warm blue of the Pacific which now are under Japanese mandate. The largest is less than 13 miles in diameter, while a half dozen coconut trees, surrounded by nature's breakwater of mangroves, tells the whole story of many of the smallest. Nobody knows how many or how large they are. One careful estimate is 1,000 islands, with a total area of 970 square miles.

Sown in the form of an inverted T, the islands stretch 2,462 miles east and west, just north of the Equator, from Lord North Island, the westernmost of the Carolines, to Mille Atoll, the easternmost of the Marshalls; and 1,170 miles north and south from Pajaros, the most northern of the Marianas, to Greenwich, in the Carolines. Small as they are, they stake out about 1,500,000 square miles in the North Pacific.*

Men of many nations — Portuguese, Spanish, English, American, French, Russian, German, and now Japanese—have wandered through the islands in the centuries since Columbus dared the unknown sea.

They came as explorers seeking El Dorados, soldiers to conquer new lands for their kings, pirates to recuperate in the balmy tropics, missionaries to teach and trade, "blackbirders" gathering laborers for the plantations of New Zealand and Australia, beach-combers drifting out their aimless existence, and all the strange medley of humanity that life's eddies cast into strange corners of the world.

Each has left a mark, a mere fleeting touch—the name of an island, a river, a mountain peak, or a family. But unconquerable nature is unchanged and the tropical jungle has covered the scars of their works, while the white skins darken with each generation of children and the family name is but a memory of an ancestor gone and forgotten.

They were but ripples on the surface. The old life runs along, deep and unchanged; the new is there for a generation, fading and disappearing in the next. At home amateur theatrical and movie companies don strange costumes to portray spectacles of departed ages. Here the past is masquerading as the present—whatever may be pleasing to the rulers of the day—and the costumes are as weird.

A GOVERNMENT IS POPULAR IN PROPORTION TO THE FREQUENCY OF HOLIDAYS

The last time our ship anchored in Ponape Harbor was on the Japanese national holiday celebrating the accession of the first mythological emperor. In 1921 it was the 2,581st anniversary.

During the hour's ride to shore in the little launch, winding between the sunken coral reefs showing white through the clear green water, the genial naval commander of the island explained that a holiday and big celebration had been arranged. Any government is popular with the natives in proportion to its holidays.

That afternoon the flag of the Rising Sun was flying over the big parade ground above the village and the naval band played the Japanese national air.

The natives were there to watch the athletic games, just as they or their fathers and mothers had come on other national holidays when the Spanish or German colors flapped in the breeze over the same parade ground and they joined in singing other patriotic songs in other languages. Some remembered the even earlier years, when Fourth of July was the big holiday, and a few could recall two occasions when bloody revolutions started against the Spanish rulers as part of the celebration of the American natal day.

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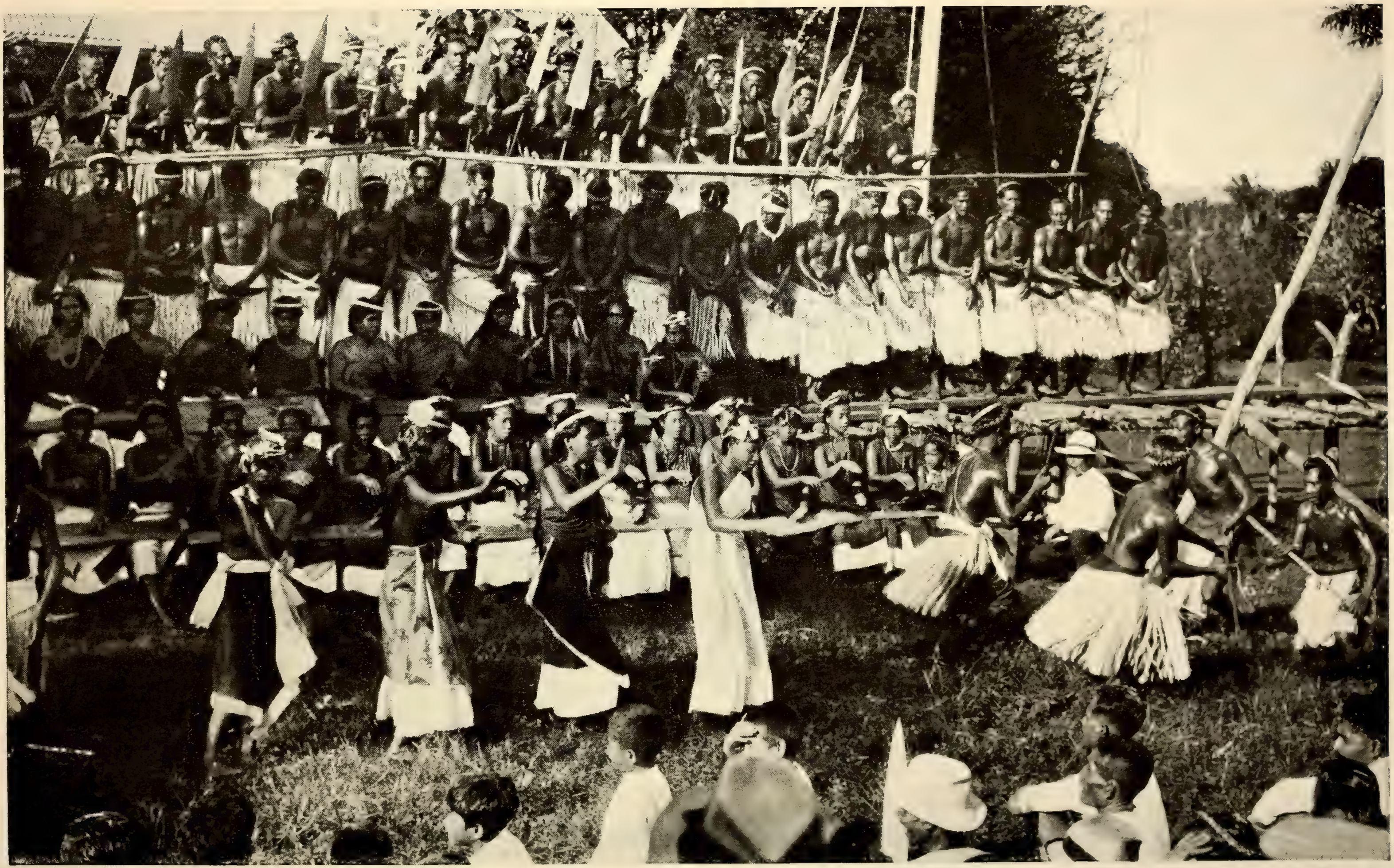
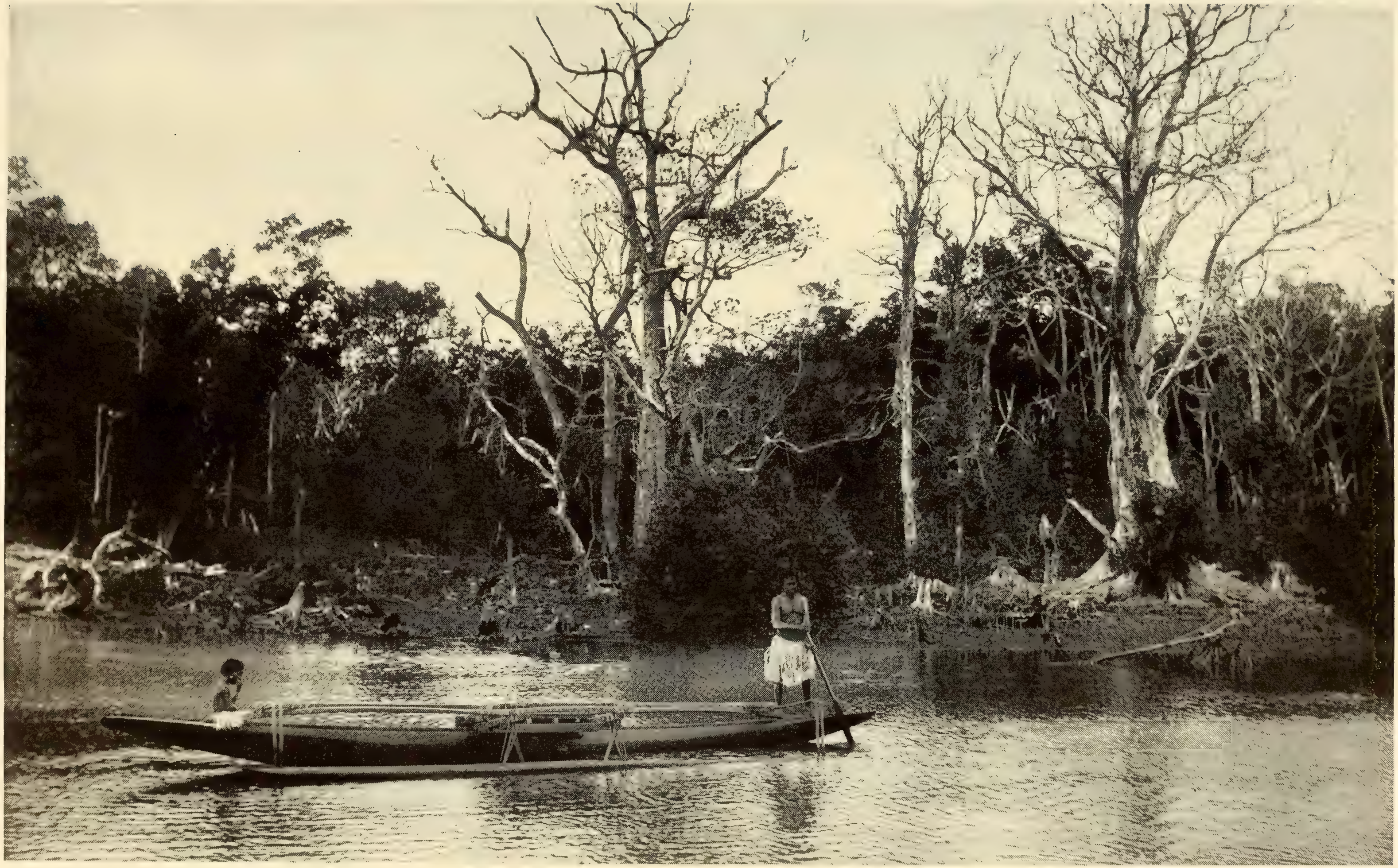
* See map supplement with this number of The Geographic.



Photograph by Junius B. Wood

THE GRAND FINALE OF PONAPE'S MUSICAL COMEDY AND GRAND SOIRÉE (SEE TEXT, PAGE 615)

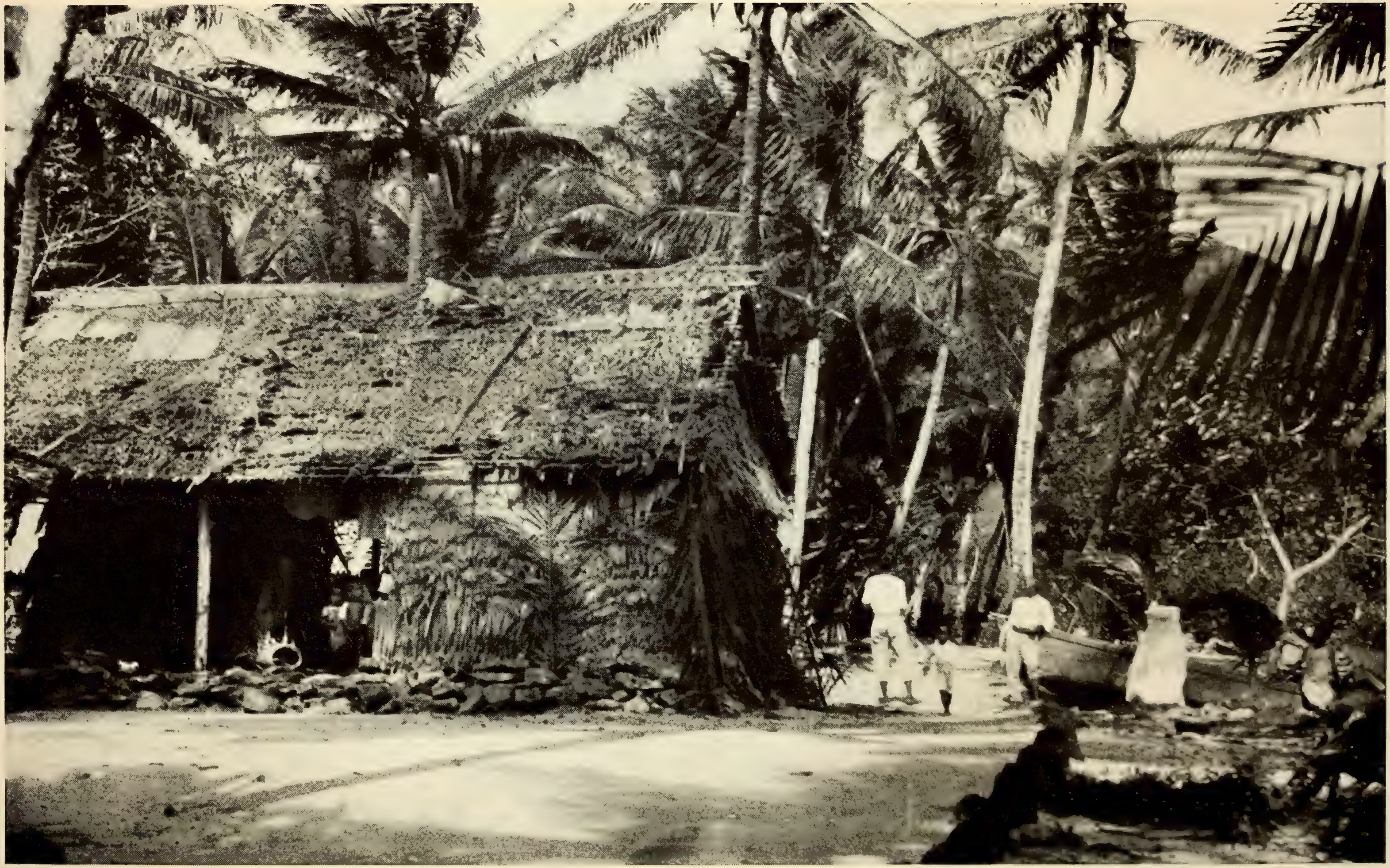
The four girls and eight men in the center of the lawn, the stars of the performance, are going through the evolutions of a wand drill and an expurgated "hula," for which the "chorus" forms the customary background.



Photograph from Junius B. Wood

ON THE KITI RIVER, PONAPE: CAROLINE ISLANDS

Back of Ronkiti, the port of Ponape, there are practically uninhabited tracts of level country crossed by many streams with cascades suitable for conversion into water-power for industrial use and of sufficient volume to float rafts and large boats.



Photograph by Junius B. Wood

A NATIVE MANSION IN THE CAROLINE ISLANDS

The dwellings, which are usually surrounded by a neatly swept clearing devoid of grass, are built upon platforms to keep the floor—the family bed—as dry as possible, for the ground is at times deluged with tropical rains.

Between the finish of a coconut-husking contest for native men and the start of a half-mile race for Japanese residents, in which merchants, officers, and sailors puffed and strained like real democrats, the busy little civil governor, tiring of the quiet monotony of a wicker chair under an awning, started to investigate the origin of a squat building between the Spanish church and the German school.

THE STORY OF A "BATH-HOUSE"

Of solid stone and mortar, with iron-barred windows and heavy doors, it had withstood time and revolutions. The governor said it was a bath-house. Several dutiful Japanese subjects corroborated his verdict and exhibited in mute proof one of the combination casks and furnaces in which they delight to parboil themselves after every day's work.

However, the Spaniards did not build block-houses of stone and iron for baths. The massive stone wall cutting off the end of the island where the settlement is located, just like the crumbling walls in Mexico and South America, showed their ambitions and fears ran in other directions.

The wall in Ponape now is an ornament of the past. The Germans cut roads through it and vines cover its rough face.

"We'll ask this woman; her father was a German," said the governor.

A young woman, fatter than any of the others in the group, sat under the shade of a tree, nursing a husky baby. A few weeks earlier she had been noticed at a native dance, her light skin contrasting with the other women, bare from the waist up, as they swayed and sung to the strange harmony.

The governor spoke to her in German. She shook her head, unsmiling and uncommunicative. The language of her father was already forgotten. The question was repeated in choppy Nipponese to a young Japanese, who translated it into the native vernacular.

"She says the Germans used it as a chicken-house," he explained.

"And what was it before it was a chicken-house?" asked the governor, like a real antiquarian.

Nobody in that ladies' nursing circle knew. Why worry about the past or future when there is nothing to worry about in the present, is Ponape philosophy.

THE GERMANS MADE THE NEW GUINEA NATIVES POLICEMEN

By this time Governor Okuyama had his dander up. Something must be found out. Leaning against a tree was a study in black and white, an outsider among the straight-haired, brown-skinned natives. Shirt and trousers were white; feet, hands, and face were inky black, with a jaunty white cap on his woolly pompadour.

"He's from New Guinea," the governor explained. "The Germans used them as policemen, because they are so black the natives are afraid of them."

The former local terror, though he understood both German and English, could not remember farther than the chicken-coop era; but, true to his police training, he went to find out. He returned with a report that it had been built and used as a jail. He added that several of its inmates, hurried to an untimely end, were buried under its cement floor, promising disturbed dreams for those who doze in its modern bathtub.

INQUIRING FOR A BOY IN AMERICA

The foot-race was finished and the governor flitted to distribute the prizes to the winners. An old man approached timidly. A smile encouraged him.

"You American?" he asked in his little-used English.

It had been ten years since the last American missionary had left the island. Possibly there is some similarity among Americans.

"A Ponape boy lives in United States," he said.

"Whereabouts in United States?" I asked.

He shook his head hopelessly.

"Just United States," he replied. "Perhaps you know him," he added, for in all of Ponape's continent—of 134 square miles—everybody knows everybody else, as well as some of the great men on the other islands, to them far away.

"Perhaps. What's his name?" I suggested, knowing a few hundred out of America's 110,000,000.

Photograph by Junius B. Wood

THE LARGEST AND MOST PRETENTIOUS CHURCH IN PONAPE: CAROLINE ISLANDS

This edifice, originally built by Americans, was remodeled by the Spaniards, and services are now conducted in it by native leaders.

"Uriel Hadley. He's a Ponape boy," he repeated, a touch of pride in his quiet voice.

There was no Uriel among my memory of many Hadleys, and his face fell in disappointment. He could not understand that anybody could live in America and not know the "boy from Ponape." Something was wrong, but he did not know why.

I walked away from the noisy games through one of the gaps the Germans had made in the thick stone wall, past the silent church, and along a path rapidly growing narrower, as it passed from the little fields which the Japanese were cultivating into the ever-crowding jungle.

I stopped to look across the jungle-closed valley to where the late sun was tinting the palms on the mountain top, just as it had done in the dim, forgotten days when Ijokelekel came in his war canoe. The pit-a-pat of bare feet approached along the path. It was the old man, one of the coconuts salvaged from the husking bee in his hand.

"Are you a Ponape boy?" I asked as he stopped.

"I'm Ngatik boy; can't go home," he said, uncovering another of the tragic romances of the Carolines.

AN AMERICAN SAILOR'S COLONY ON NGATIK

He pattered along down the path, carrying his day's harvest, his exile and the story of Ngatik forgotten. In the early '60's an American whaler was wrecked on Ngatik, 75 miles southwest of Ponape. Visioning a choice assortment of white heads to hang from the eaves of their huts, the natives attacked the survivors.

But the sailormen were well armed, with the result that most of the ambitious warriors were killed, and the new arrivals settled down to a life of laziness and a plethora of wives until the next wandering whaler sighted the lonesome island and took them home. That accounted for the old man's familiarity with English.

"You like coconut?" he asked with native hospitality, proffering his entire meal.

"I live here, men's hotel," he explained, as the gift was declined. He trotted off

Photograph by Junius B. Wood

AN ALTAR OR TOMB IN THE SUN TEMPLE OF NANMATAL, PONAPE: CAROLINE ISLANDS

Beneath this altar there was once a large room with an underground passageway leading outside the walls of the mysterious city (see text, page 607).

on a side path through an opening in the brush.

In a little cleared space stood the "men's hotel." It was a roof of thatch, open on all sides. Fastened to the poles supporting the roof, about four feet from the ground, was a braided hammock-like floor of fibers and leaves. Cracking the coconut on the fringe of rocks which protected the hotel from the crowding jungle, he climbed to the unsteady floor, squatted on his haunches, and started the evening feast, his day's work done.

Down at the foot of the path where the narrow bay separates the main island from the rocky head of Chokach (one of 33 islets surrounding Ponape), half a dozen outriggers were tied to the mangroves. Other bare feet were coming along. An athletic young man, a wreath of flowers on his head and a shirt of fiber strings covering his hips, untied one of the canoes. The little narrow hull, hollowed from a single tree trunk, was so narrow that his knees rubbed as he sat on the cross-bar.

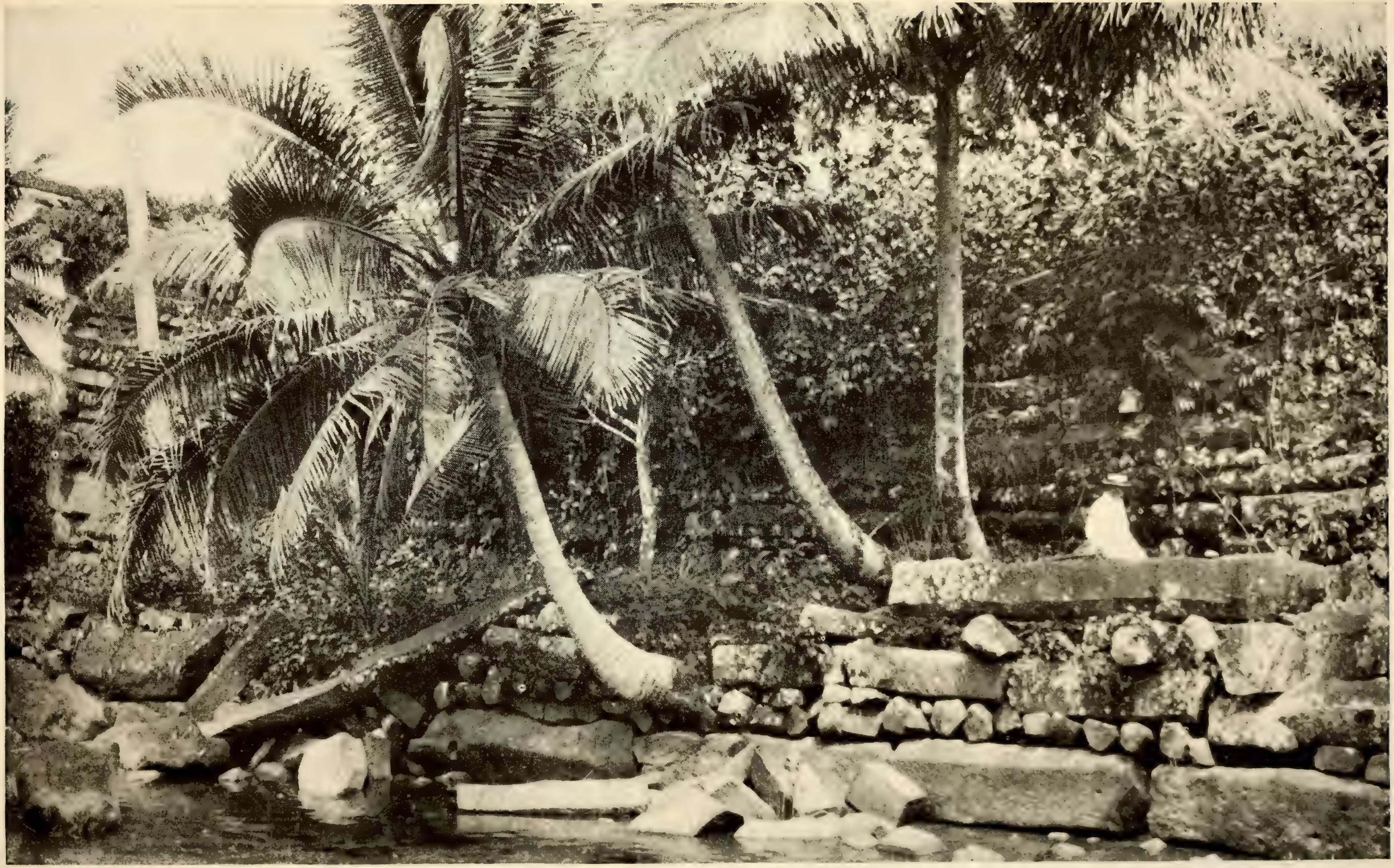
"Want go Chokach?" he offered.

"I'm Pingelap man," he vouchsafed, as his narrow paddle drove the canoe across the quiet water.

Hospitable, good-natured, and easy-going, the Ponape natives have a temper which flames into wild revolt when pressed too hard. The first Fourth of July revolution against the Spaniards, in which the governor and four others were killed, a carpenter being the only one able to escape to the warship *Maria Molina,* was precipitated when a road boss forced the natives to pick up rubbish with their hands.

The next revolution, in 1891, started over the rivalry between an American mission church and a new one established by the Spaniards near Metalanim Harbor, on the east side of the island. The natives disposed of an officer and twenty-five soldiers who interfered in the religious competition, and when a larger force of two officers and fifty soldiers was sent from the garrison at Ponape their worldly worries ended with similar celerity.

A transport with 3,000 soldiers came from the Philippines. It went ashore on the reef outside of Metalanim, and in the ensuing mêlée, according to the widow of the American adventurer who later piloted the transport off the reef, three natives and 1,500 soldiers went to an-



Photograph by Junius B. Wood

PORTION OF THE WALL SURROUNDING THE ANCIENT CITY OF NANMATAL, PONAPE: CAROLINE ISLANDS

Numerous narrow, straight canals, now overgrown with jungle, encircle the walls. (See reference in "The Islands of the Pacific," page 553, and text, pages 607 to 615.)

other world to settle their religious differences.

That ended the local holy war until 1898, when the five tribes on the island were having a lively fight among themselves, which Spain, on account of its trouble with the United States, was too busy to meddle with.

After that Germany exercised the lien which it had held on the Carolines and Marianas since 1886 and bought them from Spain.

About noon, on October 18, 1910, the young German overseer of a gang of natives building roads, or rather footpaths, on Chokach struck one of the men with a whip. That was not the first occasion, but it was the last.

Governor Gustav Boeder, of Strassburg, a retired army officer, who heard of the riot and death of the overseer, hurried from his headquarters on the hill overlooking the settlement. He believed that his presence would awe and quiet the natives. He was paddled across the same narrow bay which I was crossing. As he stepped ashore, a bullet fired from the hillside struck him dead. The rifles captured in the Spanish days had been brought from the hiding places.

HEADSTONES TELL TRAGIC STORY

Four granite headstones, on which are neatly chiseled their names, ages, and the date—October 18, 1910—in the little foreign cemetery, tell the story of that day.

A month or so later a German warship happened to anchor in the harbor. The natives were as peaceful as ever, but there were no officials. "Joe of the Hills"—Joseph Creighton, a London gipsy, who lived with the natives, away from the settlement, and died in Ponape only last year—was the only foreigner alive to tell the story.

The force from the ship rounded up the inhabitants of Chokach. Half a dozen ringleaders were shot, others were imprisoned, and the remainder—about 200 men, women, and children—were deported to the barren phosphate island of Angaur, in the West Carolines. To repopulate Chokach, other natives were brought from Ngatik, Pingelap, Mokil, and Mortlock islands.

"Mrs. Anna lives Chokach," said the boatman as he lifted his canoe into a canoe-house, a thatch roof under which were a dozen outriggers, either on the ground or on cross-beams tied to the roof-poles.

Who "Mrs. Anna" was I did not know, but the affable young native said she spoke English and German, and we started along the well-built path which encircles the island. Evidently she was a local personage of importance.

THE WOMEN CARRY THEIR TOWN FROCKS AROUND THEIR NECKS

Stretches of the path hugged the shore and hillside. In other places the water would be hidden by the dense foliage.

The little houses were scattered on each side, none of them more than a hundred yards away. A few were of rough boards, one had a corrugated tin roof, but most of them were thatch roofs, woven palm-leaf walls, and roughly smoothed floors, worn shiny by many bare feet and slumbering backs. All were elevated on posts. When the weather is wet, it is very wet.

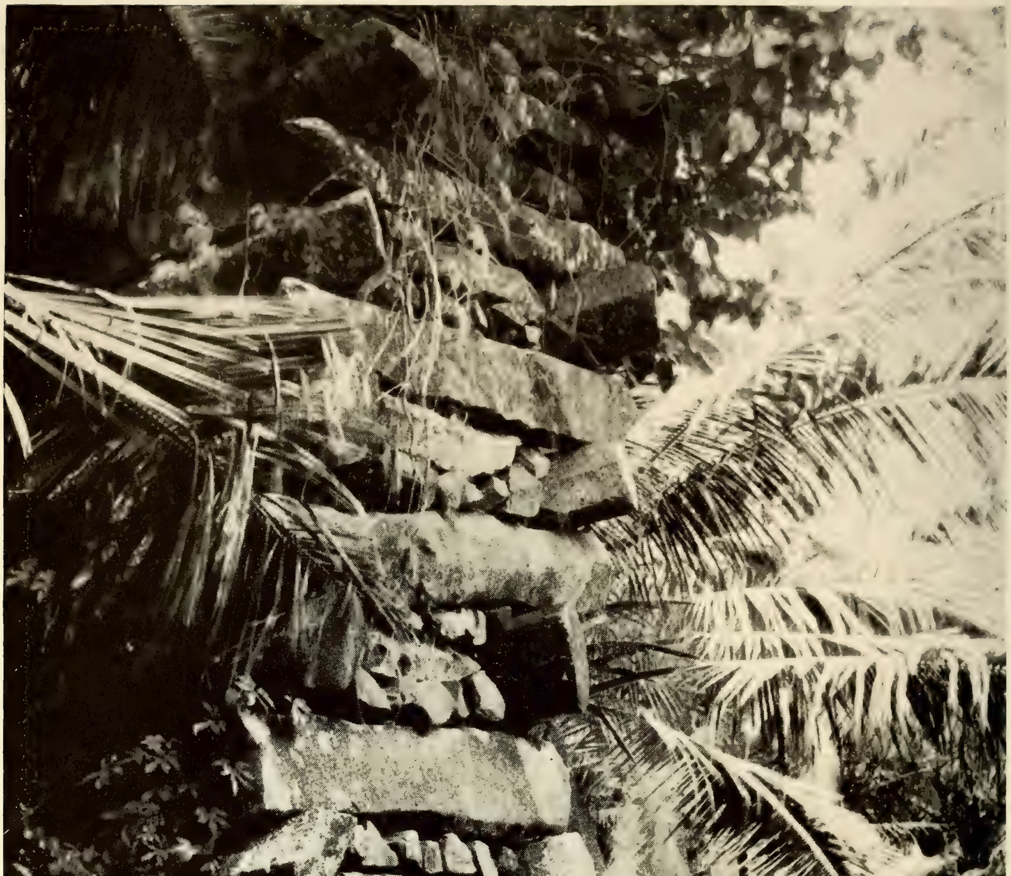
The rockiest spots also were selected for building sites. Let nature fight the battle with the jungle.

A little boy with no more clothes than when he was born and a girl with a few feet of calico for a skirt were driving a family of goats. Occasionally we met a barefoot man or woman. Some of the men wore trousers and undershirts; most of them had only the knee-length, artistic fiber skirt hiding their loin-cloth.

The women, like their sisters in lands where dress is more of a problem, had a town gown and a home costume which meant no dress at all, merely a cotton skirt reaching below the knees. Most of them walking toward the village carried the town wrapper comfortably looped around their necks, ready to be slipped over their shoulders when the settlement was reached.

MEETING THE WIDOW OF A FAMOUS SCIENTIST

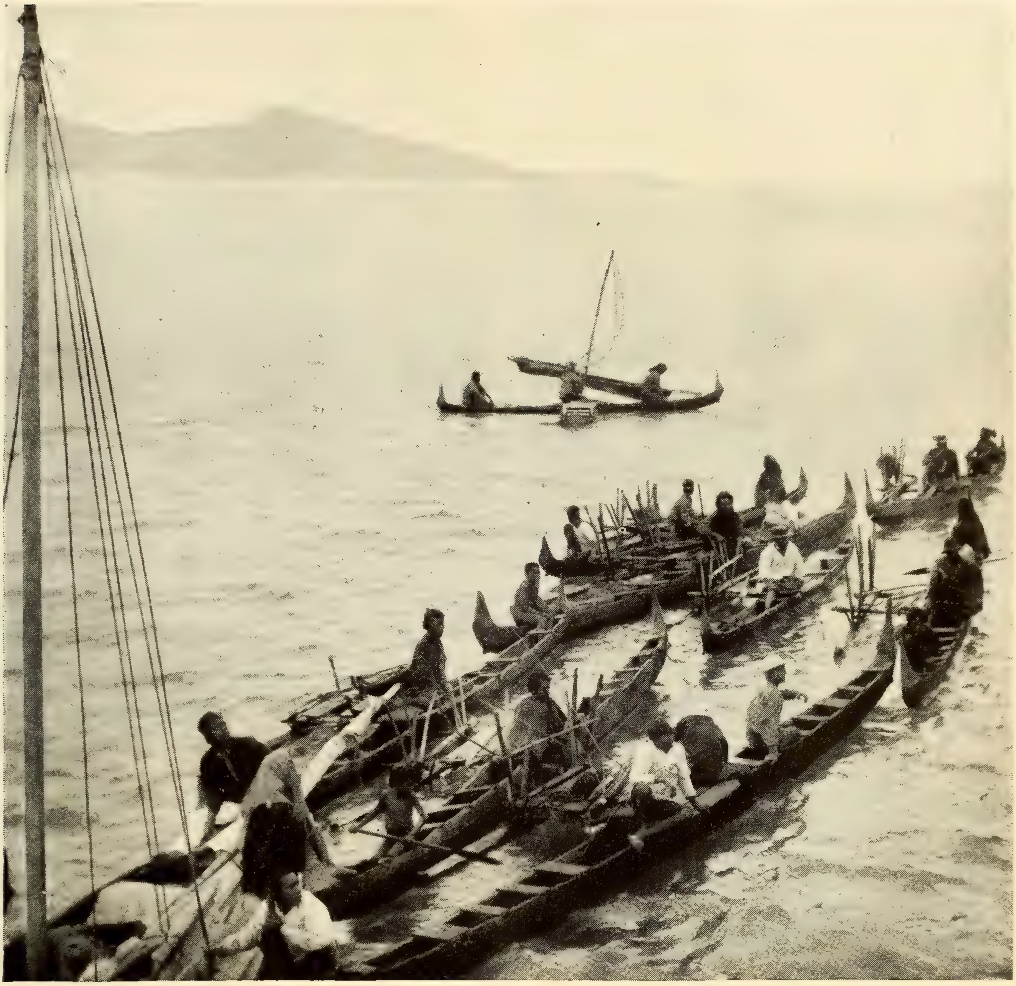
"Mrs. Anna now," said the man. A tall, straight old lady was slowly approaching. She stopped at the sight of a stranger. Her thin gray hair was smoothly parted in the middle. Many years of



Photograph by Junius B. Wood

A YOUNGSTER OF PONAPE STANDING ON THE THRESHOLD OF THE ISLAND'S MOST ANCIENT TEMPLE

Nanmatal, on the east coast of Ponape, was a prosperous city of stone walls and canals hundreds of years ago. Its origin is lost in the folklore of the islanders (see text, pages 553 and 607 to 615).



THE MERCHANT MARINE AND NAVY OF MOEN ISLAND ON REVIEW IN TRUK LAGOON: CAROLINE ISLANDS

About forty of the little islands of Truk are scattered about in this big lagoon, which could accommodate our largest transatlantic liners.

tropical suns had not browned her to the colors of the other natives. Tattoo-marks on the backs of her hands ran across the wrists and disappeared in the loose sleeves of the immaculately clean wrapper. Other designs showed on feet and ankles.

"I'm Mrs. Kubary," she said. This, then, was the relict of that striking character on whose studies much of the scientific knowledge and romantic lore of the Carolines is based, who came to Ponape when a youth of 19, full of enthusiasm and vigor, won a name for himself which reached to Europe, and wrested a wealth of coconut groves from the jungle, only to be conquered in the end, when age weakened strength and courage.

The day the fight relaxes, the jungle, always waiting, starts to reclaim its own. A monument in the little cemetery, with a bronze slab sent by his scientific colleagues in Europe, showing the profile of a strong face, with drooping moustache and eye-glasses, and the legend, "Johann Stanislaus Kubary, 1846-1896," epitomizes his hopeless life story.

The jungle has choked the botanical garden which Kubary started and closed the paths across the mountains which the warrior trod in the days when Ponape had a population of 60,000 instead of

Photograph by Junius B. Wood

THE FINEST TYPE OF NATIVE MISSIONARY

Though the American missionaries abandoned their work on the island of Truk years ago, the Reverend Ham Aettu still preaches the gospel to his people. He knows an American named Louis and would like to hear from him.

3,000. Some say that the rifles captured from the Spaniards are hidden in that jungle.

A new path around the edge of the island, built under Japanese supervision, past the houses of its remaining fringe of population, is the only route of communication by land. Lieutenant Yamanaka, the present naval commander, treats the natives with gentleness and consideration.

Seated on a rough rock at the side of the Chokach footpath, the woman, who is said to have been received at court in Berlin, and in Hamburg society in the early '90's, when she was a tropical belle, patiently told her story. Then she was 25 and handsome; now she was 56 and faded. The tropics had reclaimed her, quick and sure.

"My name is not Kubary now," she added, as if following the thought. That was another miniature of the changing life of the Carolines. When the struggle seemed never to be won, Kubary committed suicide.

The widow, still a young woman, married a young native. He was one of the leaders who killed the German governor and was executed. The widow and her daughter—she has flown from the jungle—were among the 200 deported to Angaur. The older has returned to take another young native husband. The young man in that little world who has the Kubary widow for a wife has social standing if not domestic contentment.

HER FATHER WAS A BALTIMOREAN

"My father was Alec Yeliot, of Baltimore," she continued. "He was buried here by Dr. Doane (one of the early American missionaries). I was 14 years old when I married Mr. Kubary. We traveled through all the islands while he made his studies for the Godefroy Company, and then we went to Europe.

"We went everywhere — England, France, Germany, Italy, Russia—but so much has happened to me since and nobody here understands it that I have forgotten. Only a year after we were back Mr. Kubary died, leaving me and our daughter. She is now a teacher in the French convent (naming a British city). All of the past is gone, but life goes on just the same.

"My father came from over the seas and my husband from another land. Our girl has gone, for she was of their race, but I have come back. The islands never change, and these are my people and my life."

She folded her tattooed hands over her knees, showing thin through the cotton wrapper, and silently gazed across the bay to where the Japanese transport was riding at anchor. For a few hours each month that reminder of the outside world breaks the monotony of Ponape; otherwise life flows along smoothly and contentedly, unthinking of the past or of tomorrow.

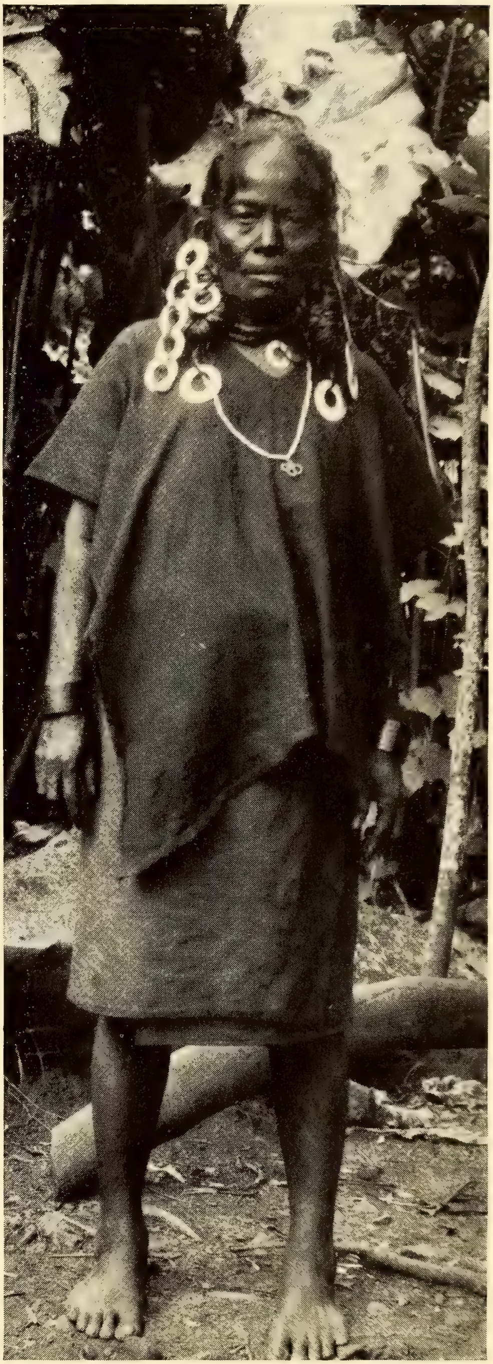
TATTOOING ADORNS THE BELLES OF OLDEN DAYS

Formerly the natives were walking pictorial histories. After the missionaries came, tattooing was discouraged, not caring to be tattooed themselves, and in recent years it has been prohibited. It was considered a sign of courage, without which a young man or young woman was not worthy to marry. This practice even went so far as systematic mutilation of the sexual organs. Scientists are divided whether this, an epidemic of smallpox brought by a whaler, or the frequent tribal wars are responsible for the diminished population.

The young people still practice an effete modification of the old tests of courage by pricking cicatrices, or little raised welts, on their flesh. Most of the girls prefer the right shoulder for the adornment, though some have them on their breasts. The boys adorn shoulders and chests.

The welts, which are formed by making a fairly deep cut in the flesh and keeping it open until the new skin grows into a ridge, are usually about an inch long and a quarter of an inch wide. Sometimes they are arranged in straight lines, one for each admirer, like the bangles on a high-school girl's friendship bracelet; again they may make an asterisk or are scattered indiscriminately over shoulders, breast, and back.

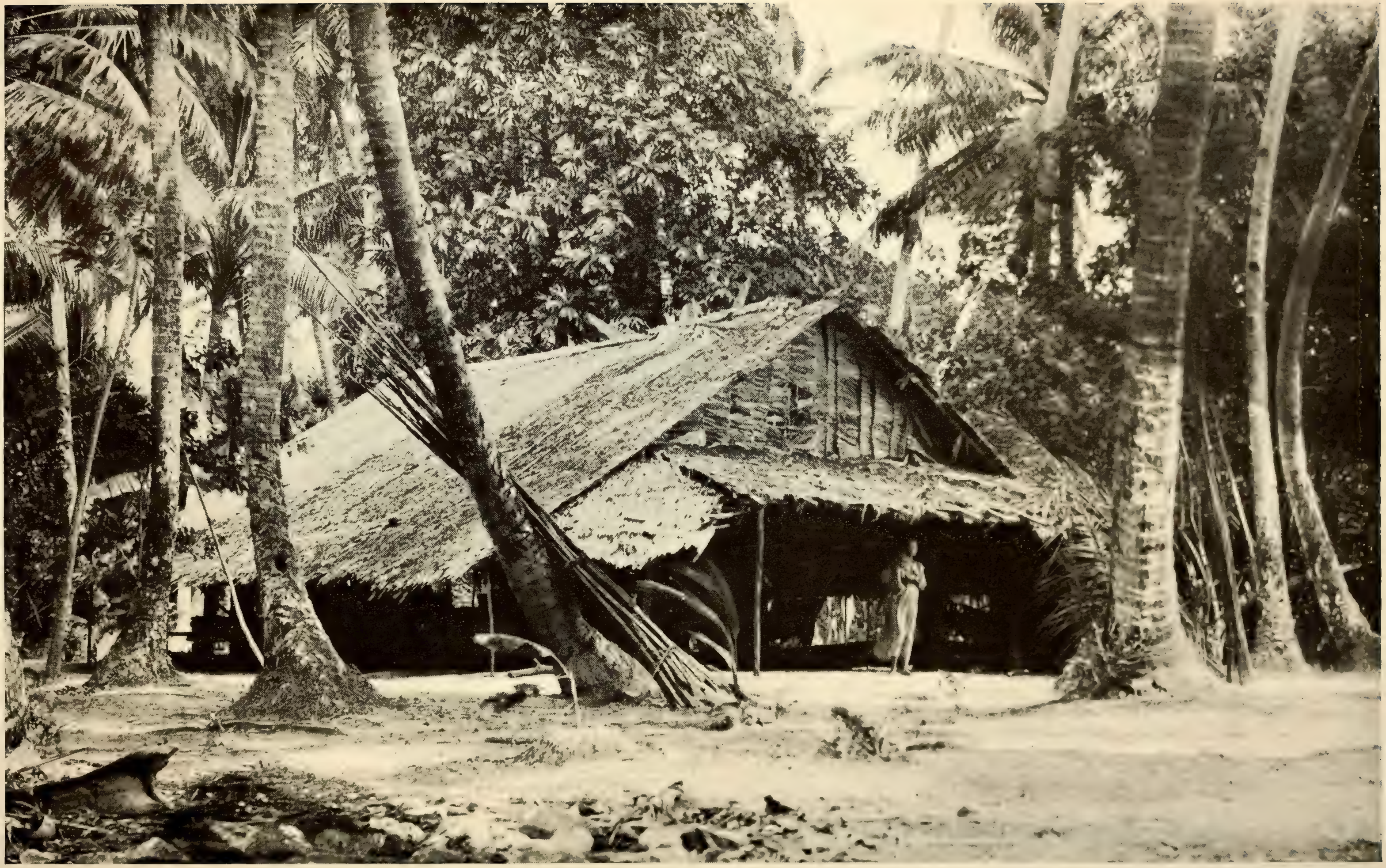
The older people still show the old adornment, the lobes of the ears stretched into loops until they touch the shoulders, and bodies and limbs tattooed, the most distinctive effect being broad parallel stripes of solid black from ankles to



Photograph by Junius B. Wood

CORRECT "STREET" CLOTHES IN TRUK

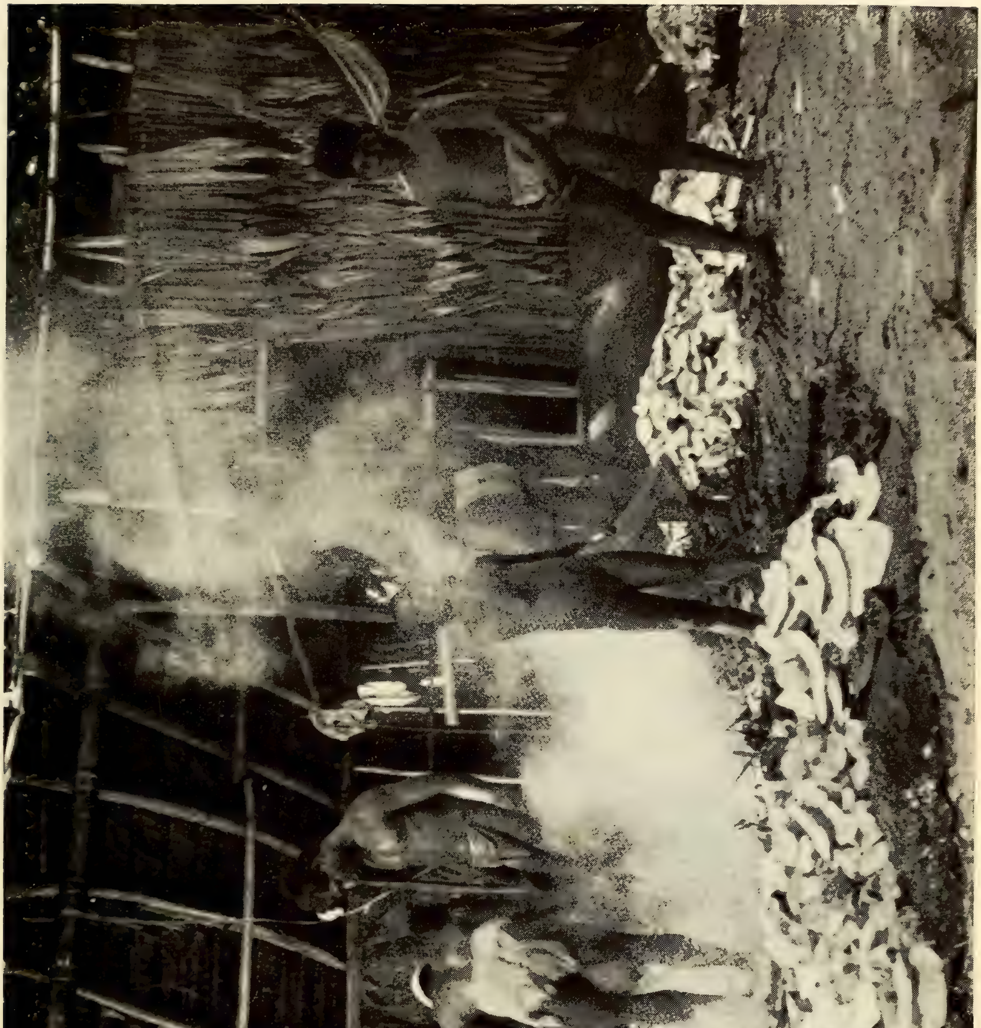
This one-piece poncho-like garment is the prevailing style in the Caroline Archipelago. When the wearer is working or away from the settlement, he throws it aside, leaving his waist and shoulders bare. Both the men and women of the older generation are tattooed, but this practice is now prohibited.



Photograph by Junius B. Wood

THE BEST HOTEL IN TRUK: CAROLINE ISLANDS

The guests sleep on especially prepared platforms, and an individual may surround his particular corner with nets or leaves for privacy and protection from mosquitoes. There is always plenty of fresh air, as the house is open on all sides.



Photograph by Junius B. Wood

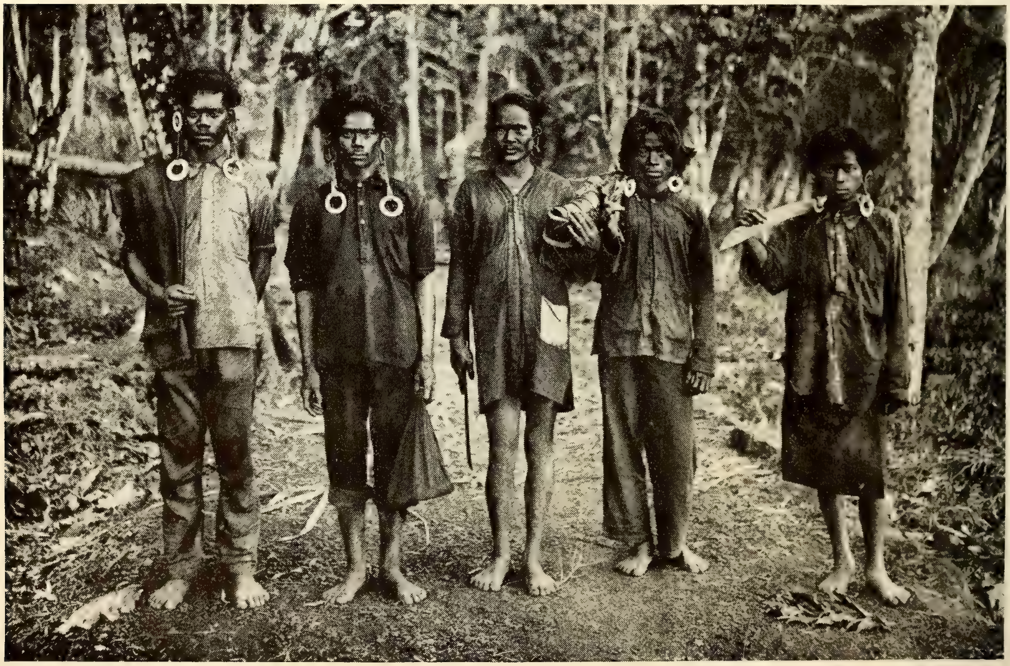
THE CHEFS OF TRUK PREPARING FOR A COMMUNAL FEAST

The breadfruit has been scraped and quartered and the shoots of the banana are being spread on the red-hot stones in preparation for the baking.

Photograph by Junius B. Wood

FISHERWOMEN HAUL THE SEINE IN TRUK: CAROLINE ISLANDS

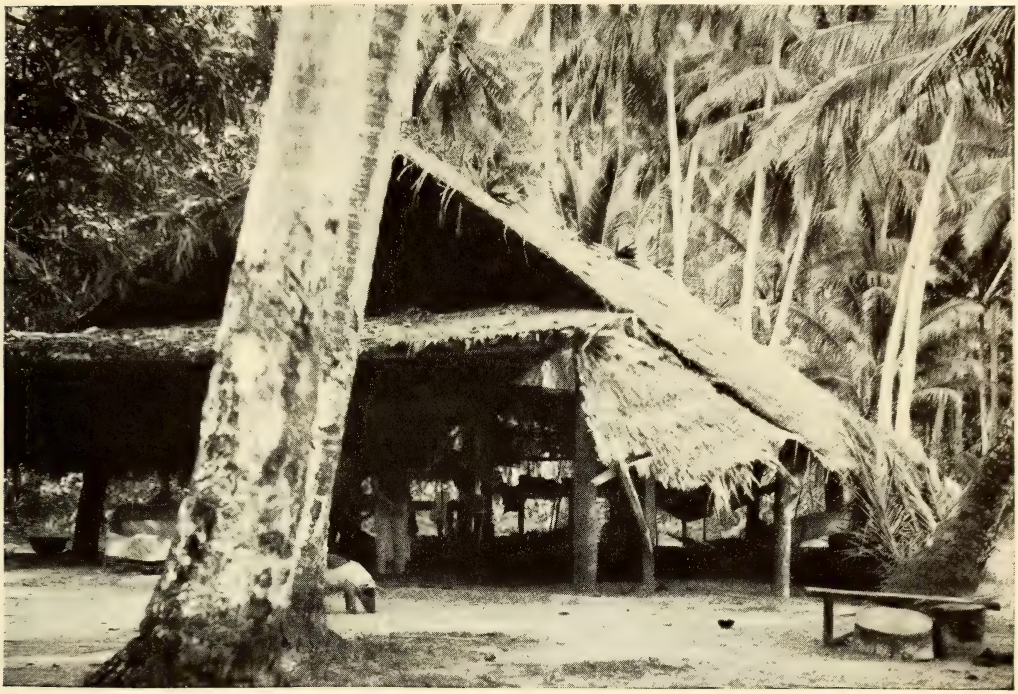
They advance in a long line, holding the big nets in each hand, and thus form a wall as they drive the fish into shallow water. Daily practice has taught them the proper moment to wheel into a circle and land their catch.



Photograph from Junius B. Wood

A GROUP OF NATIVE MEN OF WOLA, A SETTLEMENT ON THE ISLAND OF TRUK

The natives pierce the lobes of their ears and load them with such heavy weights that they expand to enormous proportions. The hill tribes of Truk are darker in color than the people of the coast, who are of light reddish-brown hue.



Photograph by Junius B. Wood

"ALL MEN'S HOUSE," OR BACHELORS' CLUB, IN TRUK: CAROLINE ISLANDS

The club is the common sleeping place for any man without a home, as well as the storage shed for disabled canoes and other rubbish. It usually has a roof of thatch and is open on all sides.

thighs. However, they follow modern conveniences and wear the long loops wrapped around the ears close to the head when they work, while skirts drape the gaily tattooed legs of the social leaders of former days.

That night there were open-air movies and Japanese sword dancing by sailors and a couple of proficient native boys on the lawn of the official residence. Visitors and dignitaries had chairs, while the others stood or squatted on the cool grass.

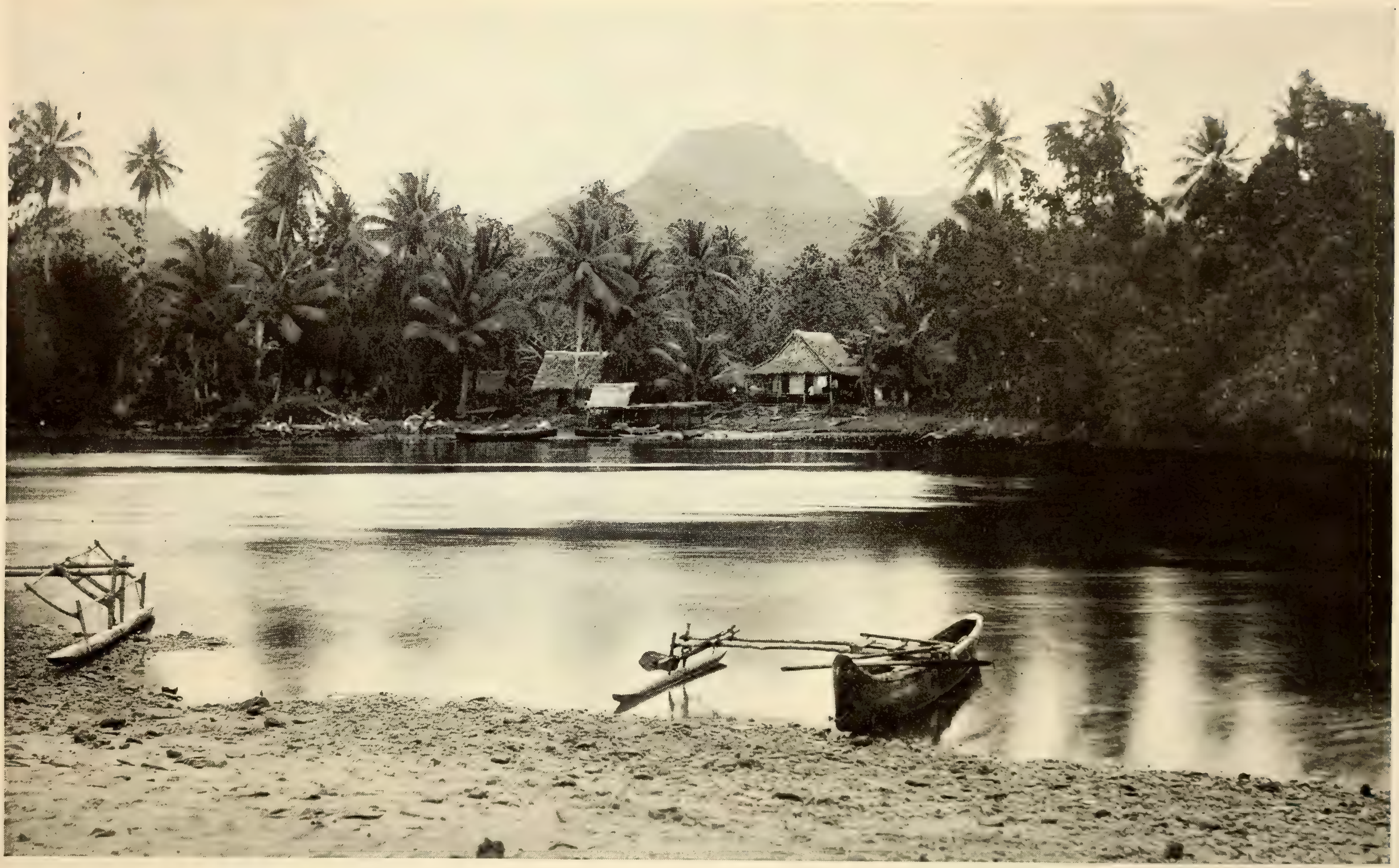
Movies were a novelty to the natives, but comparatively few had the energy to walk the quarter mile from the settlement to the grounds. An American comic of an indestructible man wrecking furniture, and pictures of Japanese warships, including a boat crew feverishly lowering a cutter, were the hits of the evening.

THE MYSTERIOUS CITY OF NANMATAL

Late that night, when the others were sipping the inevitable tea on the broad veranda, I slipped away down the long hill toward the settlement. In a pocket was a little map in India ink and water colors which Kubary had made in 1874 of the ruins of Nanmatal, the city of stone walls and canals off the east coast of Ponape which has outlived the facts of its origin (see illustrations on pages 597, 598, and 600).

Storms through countless generations have filled the broad, straight canals until the sands are dry at low tide, but the walls of heavy basaltic monoliths, in some places 30 feet high, have withstood typhoons and earthquakes, proof of a civilization forgotten when Quiros came, in 1595, and found the natives living then in flimsy houses of thatch and sticks.

Charles Darwin, F. W. Christian, the Rev. MacMillan Brown, Dr. Amberg, and others of greater or lesser fame have delved in the ruins near Metalanim harbor and evolved theories of their origin. They do not agree whether the patch of land, 1,200 yards long and half as wide, once was a tropical Venice or whether through the ages it has been gradually sinking, swallowed by the sea and smoth-



Photograph from Hugh M. Smith

FENGAL VILLAGE, PORT LOTTIN, KUSAIE: CAROLINE ISLANDS

Kusaie well deserves its soubriquet of "Garden of Micronesia." On Lele, an islet of Kusaie, it is said that there grows a species of wood admirably suited to shipbuilding, being tall, perfectly straight, and of great durability.

ered by vegetation. The waves still beat against its massive sea-wall, while hundreds of little shell rings, used for money and necklaces, can be found even today.

One incident chronicled by all the scientists, like the fragment of bone from which the archeologist reconstructs a dinosaur, is that a metal spear-head was once found in the ruins; and another, less generally known, comes from Capt. John J. Mahlmann, of Yokohama, that, 40 years ago, he copied two Chinese ideographs carved on one of the big stones. However, the whereabouts of the spear-head is unknown and the letter, which the English captain sent to Shanghai, was lost, and he never could locate the stone again.

Some say modern buccaneers built the city of stone without the natives knowing it; others trace it to the copper age, and the present Japanese claim it was the work of their ancestors, who built the uncemented fort in Osaka.

A similar deserted city stands in the hills on the mainland of Ponape, back of the port of Ronkiti, on the southwest corner of the island. Near this is the home of Henry Nanpei, a remarkable native chief, who has traveled extensively in Europe and America and is the bulwark of the Christian work on the island. He probably could tell more about the ruins than any other man; but the scientists have confined their researches to Nanmatal, which is more easily accessible.

Kubary first searched Nanmatal for Godefroy's museum, and when Governor Berg was in the islands he shipped so many specimens to the Leipzig Museum that the government sent an expedition to clear away the jungle and study the city and the slightly different ruins on the island of Kusaie.

The latter adjoin the settlement, and as soon as the expedition left, the natives, directed by an unawed American planter, supplemented the visitors' labors by using a good portion of the uncovered walls for building a breakwater and pier, greatly to the wrath of the Leipzig students of ancient history when they heard about it, a year later.

After his last visit to the Nanmatal ruins, Governor Berg died suddenly, justifying the native superstition that the gods punish intruders.

The present governor has a big white book in which visitors, either after exploring Nanmatal or discussing it in the cool of his residence, are requested to write their opinion of its origin.

The sight of the massive walls, silent and impressive, still surrounded by the narrow, straight canals and overgrown with jungle, is worth the blistered back, wet feet, and skinned shins necessary to reach the ruins. However, as each student has a different verdict, the present method, more reassuring for governors and less strenuous for visitors, may be equally conclusive.

NIGHT ON PONAPE

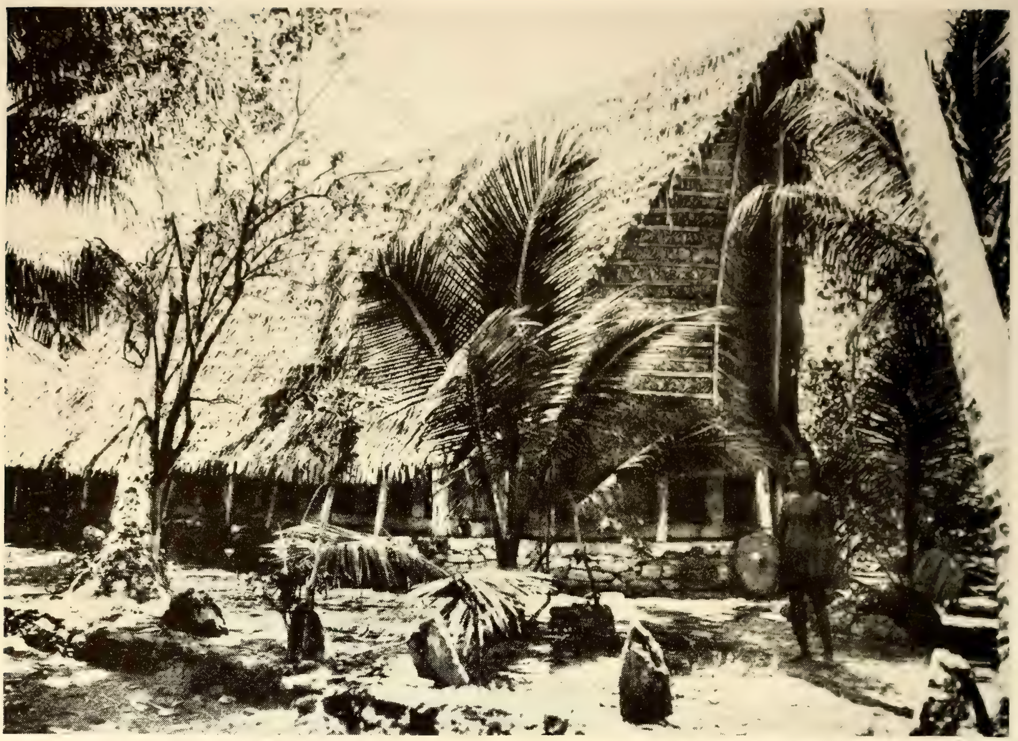
The broad road from the headquarters residence to the village below was a silvered path between black walls of trees. Only the stars were in the sky that night, and nowhere are they as bright as in the tropics.

Through the still air from a native settlement along the bay came the occasional thump of a drum and the echoes of laughter. The big parade ground was silent and deserted, the old Spanish wall and the new Japanese school-house ghostly in the starlight. No spooning couples were in the village park.

The local police turn in early in Ponape. The governor says he has arrested only twenty-two men, all for stealing. One took a bottle of sake from the Japanese store and the others eloped to short distances with their friends' wives. As the authorities discourage primitive methods of vengeance, local home-wreckers are put in jail.

The house where I was going was dark, but alive with the deep breathing of many sleepers. It was a pretentious dwelling, long and low, like a field barracks, with a narrow porch along the side, on which opened the rooms for different families. A "Hello!" brought an answering shout, and I stepped through an open door into darkness. Somebody appeared with a lantern.

My host and his family had been sleeping according to the custom of the tropics. The wife slipped on a skirt, and he with two stretches was fully clothed in shirt and trousers. He took the lantern and we went into the residential social hall,



Photograph from Junius B. Wood

ONE OF THE UBIQUITOUS CLUB-HOUSES OF THE CAROLINES, NEAR TOMIL: YAP

This is where the traveler, if he be a man, meets the men of the islands to discuss politics, crops, and the high cost of living, and to hear stories of the daring deeds of bold chiefs, love intrigues, and the gossip of the Pacific.

a room with a table and two chairs and a waist-high wall on three sides. The men and boys, who had been sleeping on the floor, pulled their mats outside and continued to snore.

KUBARY'S MAP OF NANMATAL

The map which Kubary had made nearly half a century ago, with its water colors showing land and water, and each ruined building drawn to scale, was spread on the rough table under the smoking lantern. Each site had been numbered, corresponding to a list of names in native dialect down the side, like a city visitor's guide, showing the theaters, railroad stations, and leading hotel.

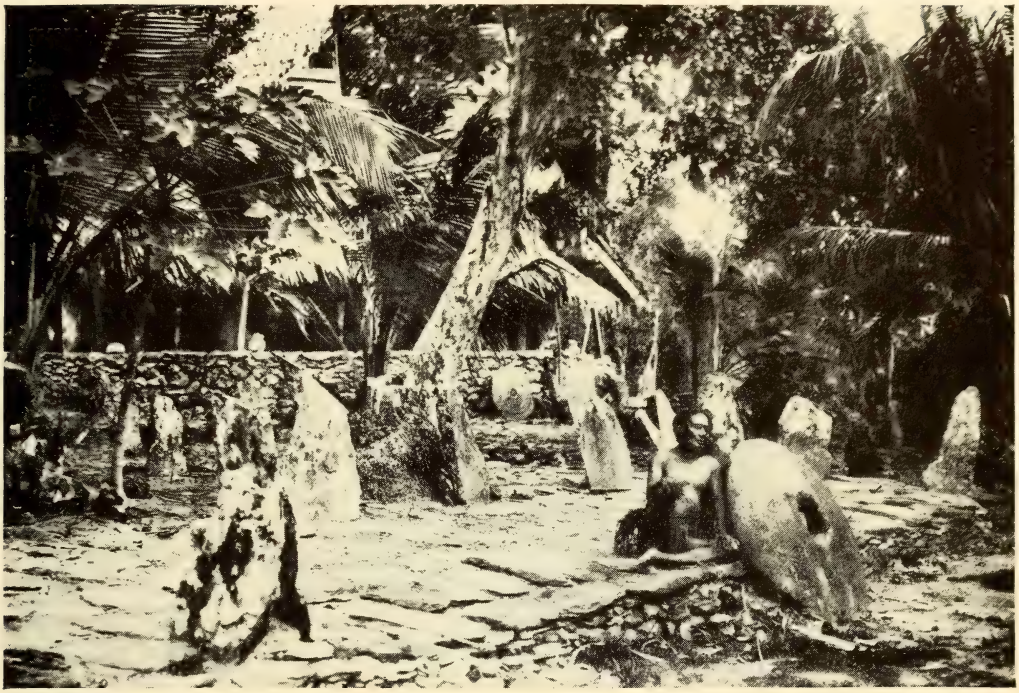
"Those are our names for the city," he said.

There were thirty-three which Kubary had identified and nearly as many more about each one of which this man told some story. One was the king's castle; others were the prince's castle, temples, forts, sepulchers, and holy places which common people must not enter.

Nanmatal means "in many openings," and the other native names were translated on the map into such crude descriptions as "great castle," "on the corner," "in the largest breakers," "coconut castle," "shadow of a tree," "under the chasm," "in the sepulcher," and so on for half a hundred buildings.

"My grandfather was an American, but it is hard to translate the names," he said. "My father was a native, but I have an American name. I want to go to America some time."

He pointed out the burial temple, where Governor Berg did his last excavating; the broad inclosed stretch of water, now filled with sand, which had been the inner harbor, and the wide entrance used for an anchorage when storms did not lash the sea-wall. His spirit seemed to go back to the past glories of that distant age.



Photograph from Junius B. Wood

THE FRONT YARD OF THE TOMIL CLUB-HOUSE: YAP

The ground around the building is covered with flat stones, and here many of the native conferences and dances are held. The man in the picture is leaning against one of the yellowish limestone discs that were formerly used as money on the island (see text, page 621).

"Here's where the canoe stopped," he mused, putting a finger on an unmarked spot on the south side of the ancient city.

"What canoe?" I asked.

"That's only a story," he said. "We're Christians now and don't believe those stories any more. It's only what the old natives tell."

NATIVE STORY OF THE MYSTERIOUS CITY

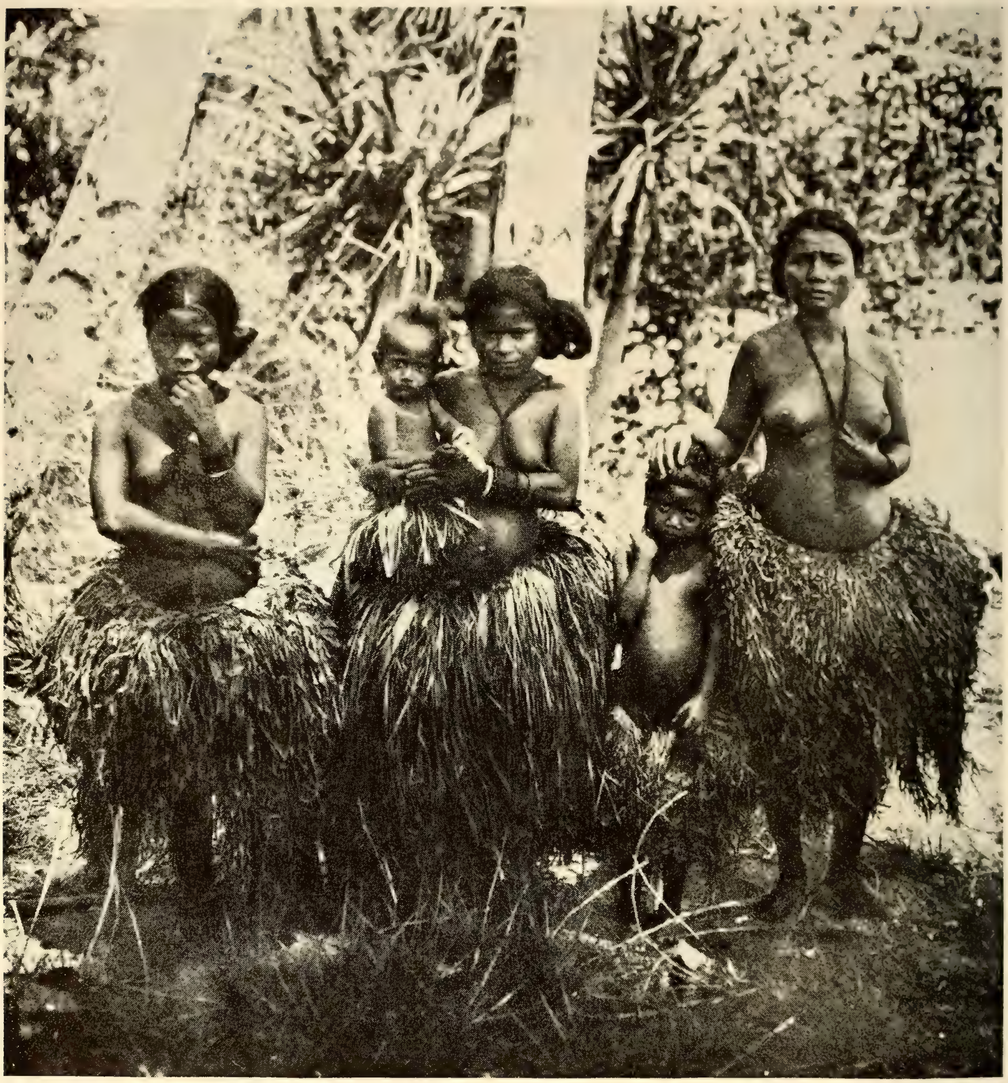
However, from his refusal to accompany me to the ruins and the reluctance of any natives to visit them, their superstitious belief in the dangers of the present world seem to outweigh their confidence in the safety of the future. He told the story, and it is probably as good a version of the rise and fall of the mysterious city as any which the scientists have concocted.

"Once two brothers, Oleosiba and Oleosoba, came to Ponape. They became chiefs and joined all the tribes in Ponape into one tribe. They wanted a great city and just asked for it, such was their power, and it came down from the sky just where it is at Nanmatal today. The other city, at Ronkiti, was built in the same way, and one brother lived in each city, ruling over the island. After them for hundreds of years there was only one king in Ponape. Soutolour was the last.

"When he was king, Ijokelekel, a warrior from Kusaie Island, which we call Kodou, came to attack the city. He had only one canoe and it carried 333 men. They reached Ponape in the night, and when day broke they saw the thousands of palms on the mountains and thought they were warriors, and were afraid to attack and went back to Kusaie.

PONAPE BETRAYED BY A WOMAN

"Ijokelekel came again in his canoe with 333 men and circled the island. Each day, from a distance, they saw the palms and were afraid to come closer, but went home a second time. When he came a third time he went only half way around the island and put the canoe into the harbor at Ronkiti. He sent some of his men ashore. Their instructions were:



Photograph from Junius B. Wood

WOMEN OF TOMIL, YAP, WEARING THE NECK ORNAMENT MADE FROM THE HIBISCUS

Every woman and marriageable girl wears this ornament, which is dyed black, and to appear without it would be immodest. The wide, full skirts, made of the leaves of the coconut tree, prove quite convenient go-carts for the babies.

" 'If you see any people ashore and there is an old woman among them, run back to the canoe, for I will go ashore and stay with her tonight.'

"Soon the men came running back, saying they had seen an old woman. Ijokelekel went ashore and found her. That night, as they talked, he said:

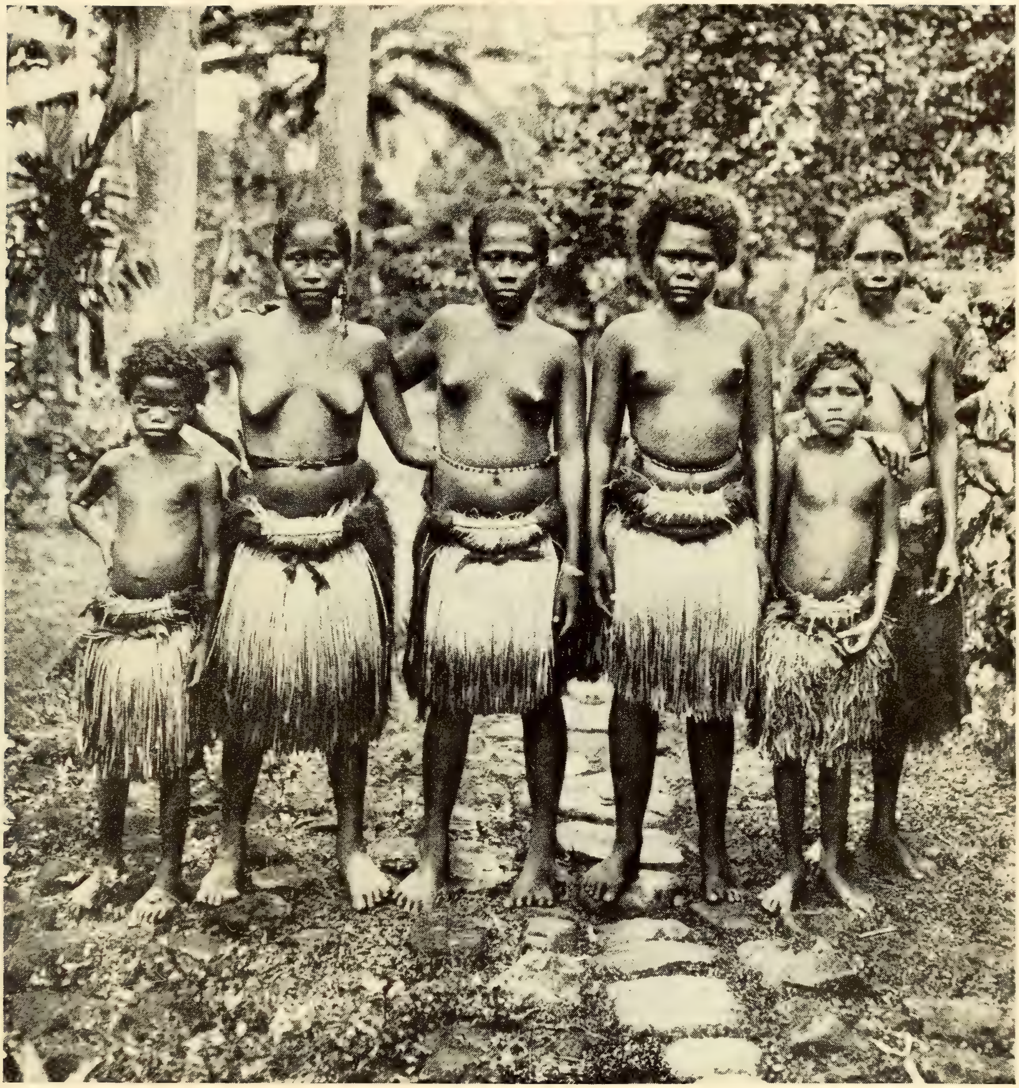
" 'There are many warriors in Ponape.'

"The old woman replied that there were few men, but many women on the islands, and that the warriors from Kusaie should stay and make their homes there.

" 'But I have seen your warriors standing by the thousands on the mountain tops,' said Ijokelekel.

"Then the old woman, proud to show her knowledge, as all women are, laughed at him and answered:

" 'They are only palms, and what you think are the waving spears of the war dance are only their branches blowing in the breeze.'



Photograph from Junius B. Wood

THE GRASS SKIRT IS NOT PECULIAR TO THE "HULA HULA" GIRL

These ladies of Korror, in the Palao Islands, are wearing the typical skirts, consisting of a front and back piece, made from the stems of a native plant. The débutante announces that she is "out on the carpet" by assuming a narrow belt of plaited leaves or of colored yarn like the neck-cords worn by the women of Yap (see illustration on opposite page).

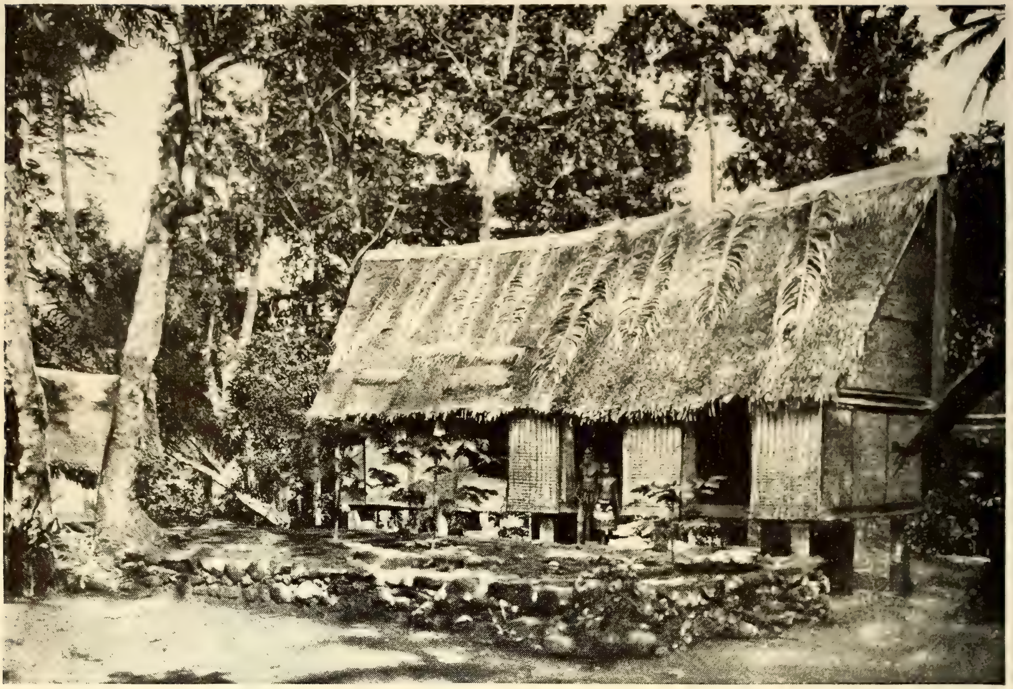
"Ijokelekel had learned what he wanted. He ran back to the canoe and they paddled around to Nanmatal. At daylight they attacked the city. Here is where they left the canoe.

"Jauteleur, a great warrior, led the men of Ponape. They fought for two days, and each night the warriors from Kusaie were beaten back to their canoe.

"On the third day Jauteleur was again pushing back the strangers when one of the warriors from Kusaie drove a spear through his own foot, fastening it to the ground. The other warriors, who were running away, saw that their comrade stayed to fight, and came back to help him. They captured the city."

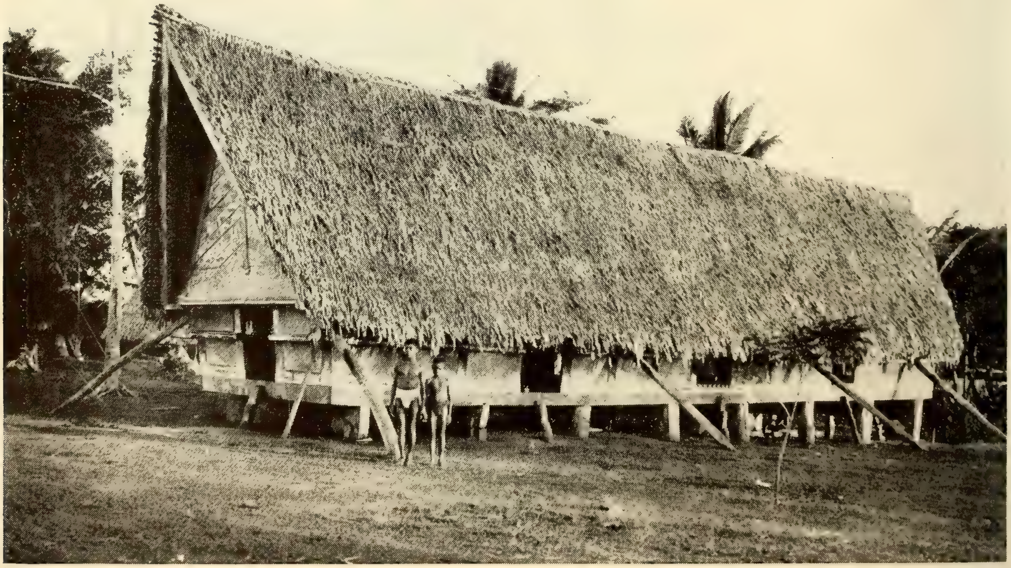
NANPARATAK, THE PONAPE ARCHILLES

My host stopped, lost in reverie, dreaming the romance of those stirring days. Civilization, with its laws and conven-



A TYPICAL NATIVE HOUSE AT KORROR: PALAO ISLANDS

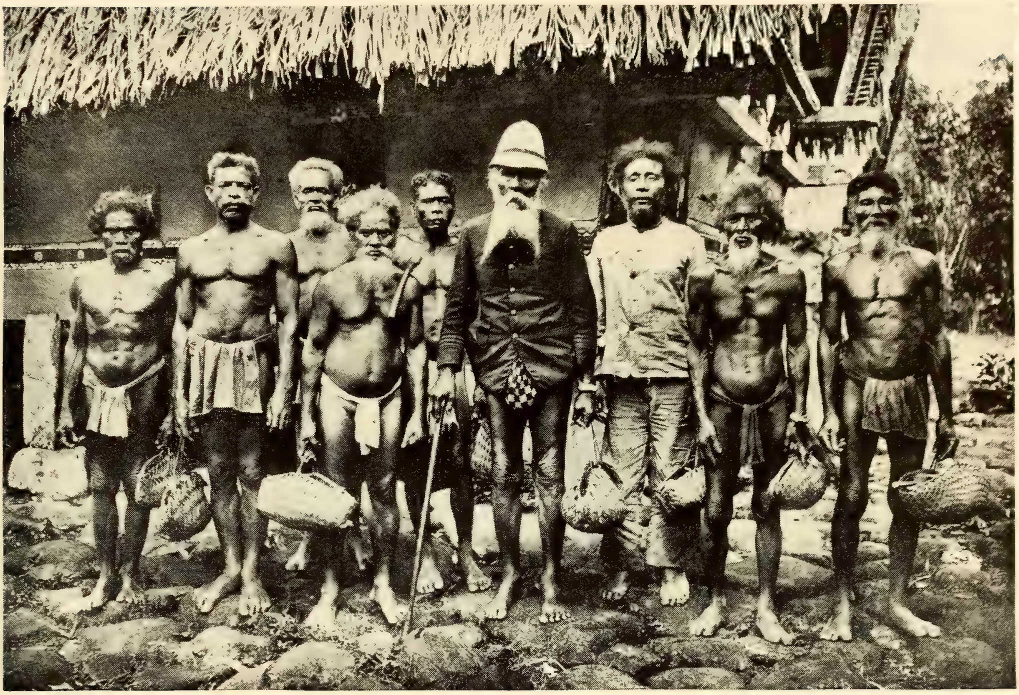
Inside the stone platform in front of the dwelling the family dead are buried. Each household has its own cemetery.



Photographs from Junius B. Wood

THE CLUB-HOUSE AT KORROR, SEAT OF GOVERNMENT OF THE PALAO ISLANDS

This house was at one time a village, but the German governor had it moved opposite his office, where it stands today. Its remarkable appearance, both the inside and outside being extensively carved, has remained unaltered.



Photograph from Junius B. Wood

A MEETING OF THE "BIG CHIEFS" OF THE PALAO ISLANDS ON KORROR

He of the helmet is the Aybathul, a chief of first rank and practically king of the Palaos. He and one other member of the group are wearing bracelets of bone, symbols of dignity. The handbag of plaited leaves carried by each chief is the Palao equivalent of a cigarette case or tobacco-pouch, for it contains the "makings" for betel-nut chewing.

tionalities of distant lands, has substituted work and worry for that care-free life. This man, a native leader, was interpreter for the Japanese chief of police. He might have been an Ijokelekel or a Jauteleur in another age.

"I have forgotten the name of the soldier who won the fight," he said, lapsing again into silence.

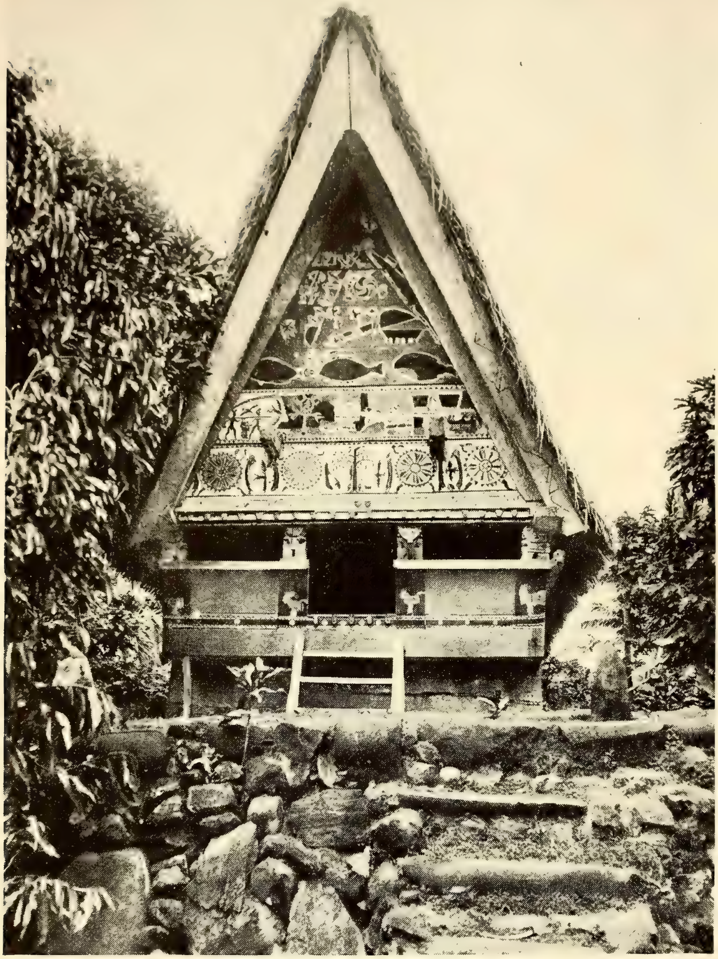
The name wouldn't come. He called in the rough Ponape dialect. The light step of bare feet came along the narrow porch. Leaning over the low wall was a woman, bare from the waist up, straight-featured, with threads of gray in the smooth black hair, sharp-eyed and strong-muscled, as if a bronze Venus of fabled Nanmatal had been conjured into the dim light of the flickering lantern. Without raising his head, the man spoke in their native language.

"Nanparatak," she said. Homer would have picked a better name for the South Seas Achilles. I wrote it down while the jargon was fresh. When I looked again the dusky vision had disappeared as silently as the mythological Helen of Troy. The legend of Greece and that of Ponape have strange points of similarity.

"Jauteleur and Soutolour were killed, and Ijokelekel divided Ponape into five tribes, just as they are today," he resumed. "But they did not live in either of the cities, for the gods who had built them were angry. Nobody has lived in them since, and when people go to them it rains and thunders, for the gods do not want them to be disturbed. Nobody has disturbed them since the German governor died."

A DANCE ON PONAPE, CENTER OF THE JAPANESE MANDATORY ISLANDS

On another day the natives gave a dance. It was a good show, but, considering the elaborate preparations and number participating, sadly abridged and expurgated. Saddened by the march of events in America, somebody wrote, "You Cannot Shimmy on Tea,' and probably the same applies to the South Seas. The League of Nations very wisely specifies



Photograph from Junius B. Wood

THE COUNCIL-HOUSE OF KORROR CHIEFS: PALAO ISLANDS

The building, which is placed on a structure of stones about four feet above ground level, is ornamented inside and out with pictorial carvings painted white, red, black, and yellow. The ordinary villagers, and especially the women and girls, are strictly forbidden to darken its doors.

prohibition for all the natives in its mandated possessions, but a reasonable ration on dancing days would undoubtedly put more "pep" into the performances. Nobody became overheated on this afternoon. At that, it was the best dance seen on any of the islands (see pp. 590-592).

Ponape is about the center of the Japanese mandatory islands. Its life and customs may be taken as a standard for all the others. Those who have passed their lives along this border of the Equator say it is the cleanest, healthiest, and happiest. Conditions and habits vary in the others; some are better and some are worse, according to the individual tastes.

Each group of islands has a language of its own. The years are not long past when each was a petty kingdom, and the stranger cast up on its shores was hailed as a gift from the gods, whose head quickly adorned the door post of the first islander to greet him.

The extent of American missionary activity can be gauged by the length of the women's skirts. In Yap, which missionary influence has hardly touched, the fluffy fiber upholstering clings precariously on the fat hips. In the Marianas and middle Carolines, skirts start above the waist-line. In Kusaie, the easternmost of the Carolines, they reach to the shoulders in one-piece wrappers. In the Marshalls, where the missionary work has flourished without interruption, the long-trained wrappers, sweeping up the dust, are further ornamented with high ruffle collars and wrist-length sleeves.

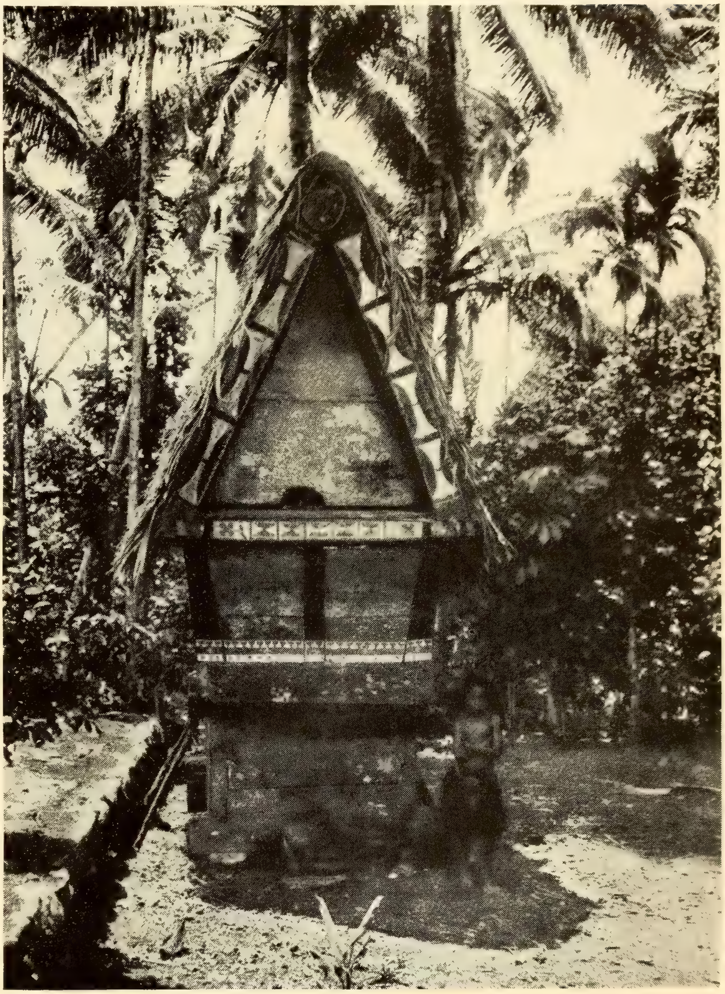
YAP VISITED BY A SERIES OF DISASTERS

The native of Yap is little concerned over the controversy which is waging in other parts of the world as to who shall rule his rocky home. Just now, his chief worry is to get enough to eat. War and the elements have completed the blight which has cursed the islands for a decade. When the English cruiser sailed past and shelled the wireless station out of existence, and a few weeks later a Japanese transport arrived and deported the foreigners, including the solitary policeman, the islander's chief source of income was gone.

The final blow came on December 7, 1920, when a typhoon leveled the vegetation on the islands, destroying most of the coconut palms, breadfruit trees, and other food supplies. The last previous typhoon had been on February 20, 1895.

About the time the new coconut trees were ready to bear, one of those strange plant sicknesses of the tropics spread over the island. The new groves, which had been patiently planted, were just coming into fruit when the last typhoon wiped out everything.

To everybody in the world except the islander himself, the location of Yap is of importance. It is about 250 miles east of Palao, the future Japanese naval headquarters of the mandate, which is some 500 miles east of the Philippines, about opposite Mindanao.



Photograph from Junius B. Wood

A SHRINE ON KORROR: PALAO ISLANDS

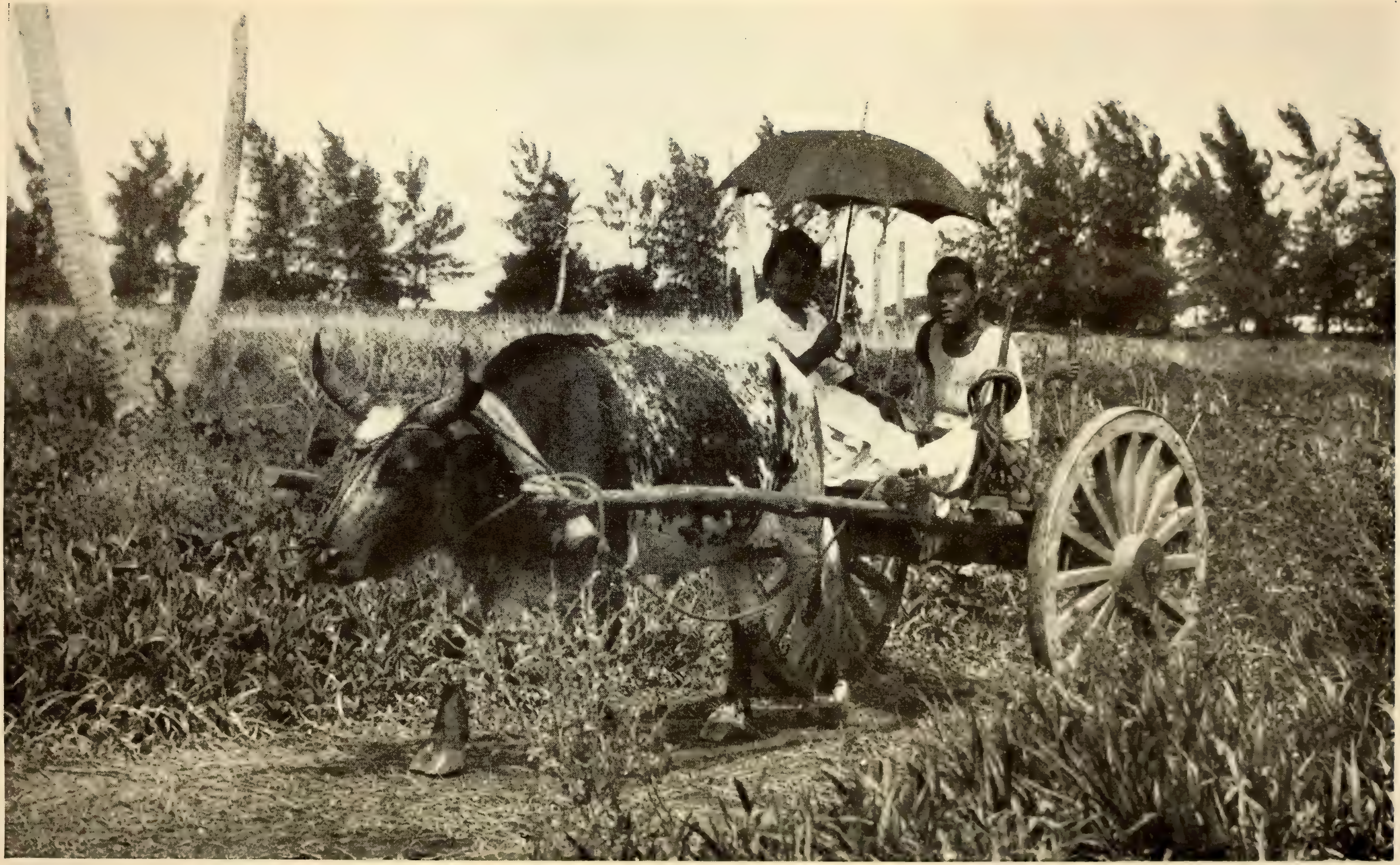
This structure, three feet wide and six feet high, is a miniature replica of the club-house shown on the opposite page. Though it is a place of worship, it contains no idol or image.

YAP ISLANDERS WERE LEADERS

Like the other forty-eight so-called islands in the Carolines, Yap is not a single island, but a cluster of small islands. There are ten islands in the group, four of which are fairly large and volcanic, all surrounded by a coral reef about 15 miles long and 4½ miles across at its widest point. Epp, the native name for Yap, is the largest of the four. North of it, and separated by narrow straits, are Torei, Map, and Rumong. Tomil is the name of the harbor and settlement, with a good anchorage, reached by a narrow passage and past dangerous rocks.

In native civilization, the islanders of Yap were the leaders and teachers for all the others. Most of the legends and customs of the old days can be traced back to Yap. Some islands improved on their lessons, others never advanced beyond crude imitations.

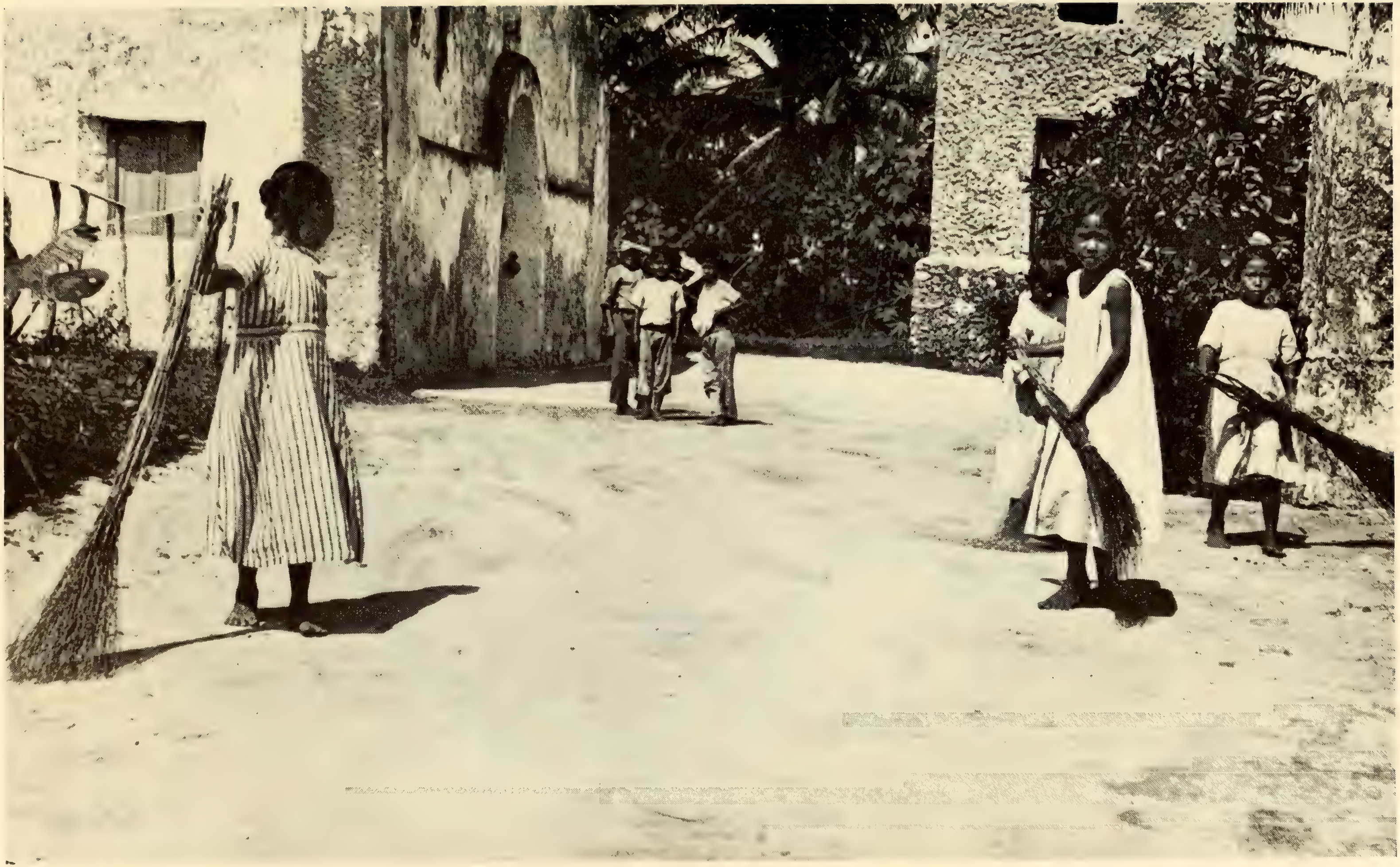
Stories are told of men from Yap coming in their canoes as far as the Marshalls, more than 2,000 miles away. They taught the others navigation. In the Marshalls, where the little low-lying patches of sand and coral are close together, they im-



Photograph by Junius B. Wood

TRAVELING A LA MODE IN SAIPAN: MARIANA ISLANDS

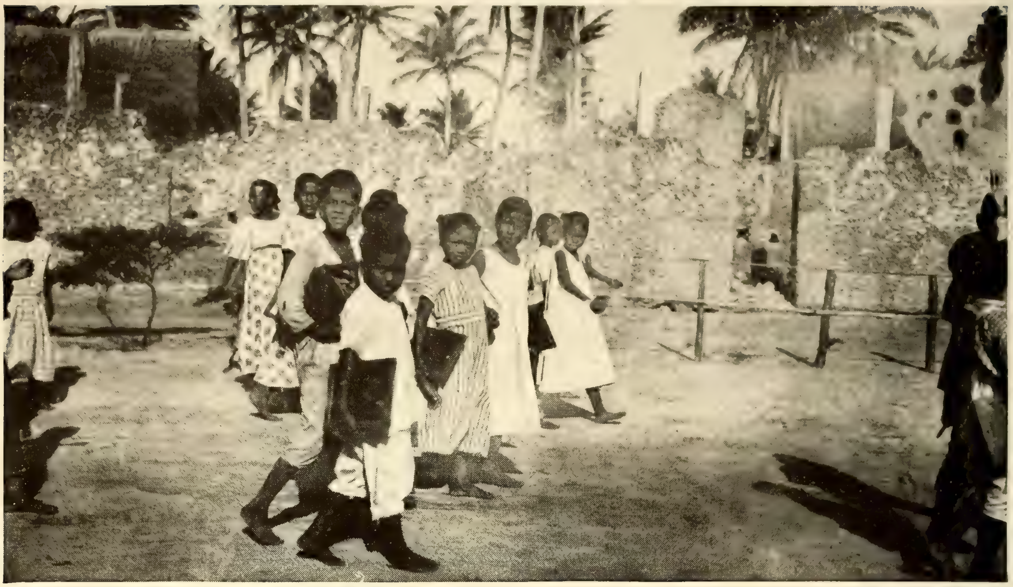
Taking an afternoon drive on some of the South Sea Islands combines all the leisurely and luxuriant features of an airing for some people in some portions of the United States.



Photograph by Junius B. Wood

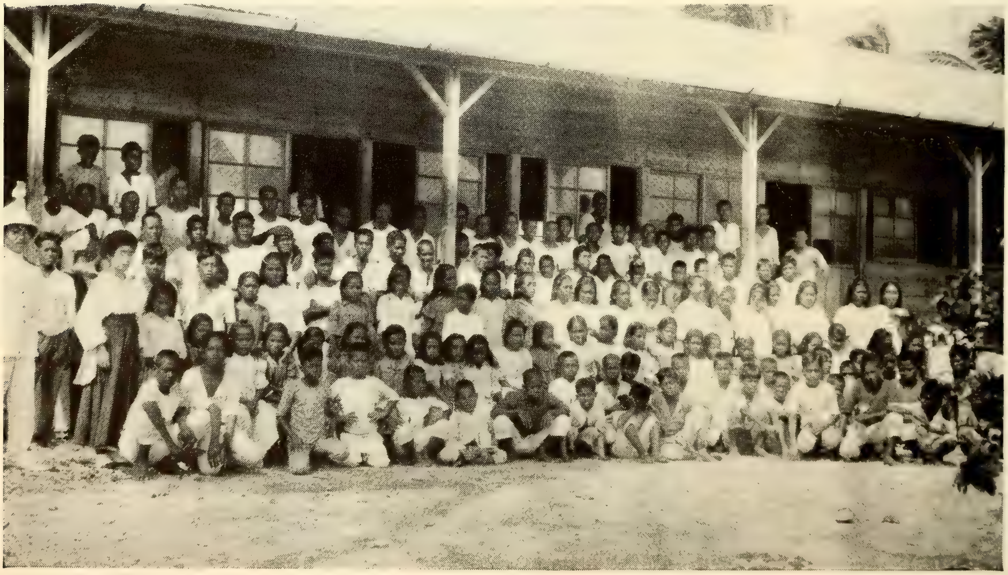
"LET THE WOMEN DO THE WORK," IS THE SLOGAN IN ROTA: MARIANA ISLANDS

The little girls keep the street around the school-house clean by sweeping it during the recess period, while the boys go out to play.



STUDENTS OF READIN', 'RITIN', AND 'RITHMETIC IN ROTA: MARIANA ISLANDS

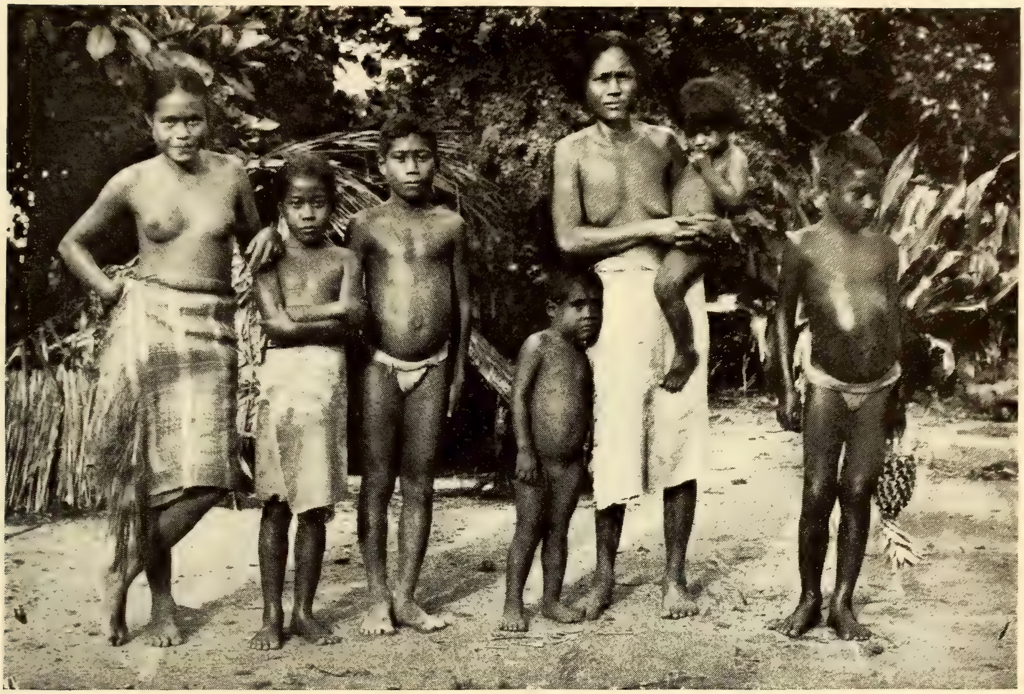
The slate is the private property of the pupil, while the text-books belong to the school.



Photographs by Junius B. Wood

THE SCHOOL AT JALUIT CONDUCTED BY THE JAPANESE AUTHORITIES

The pupils are obliged to remain for at least three years of instruction. Jaluit is the chief island and administrative center of the Marshall group.



Photograph by Junius B. Wood

A FAMILY GROUP IN SAIPAN: MARIANA ISLANDS

A sudden shower drove the photographer into a hut, where the family courteously received him, and to show their hospitality sent the oldest boy off to pick a pineapple for him. The mother was sitting upon the sleeping platform, using her spare moments in braiding a crude basket.

proved on the knowledge of the men of Yap until the seamanship of the old Marshall chiefs, sailing unerringly without compasses, reading the waves by day and the stars by night to lay their course, is a puzzle to modern navigators.

The story of the two brothers, the genesis of the legendary history of Ponape, is told with variations of names and incidents to suit the local dialects and events in the Marshalls and other islands. The brothers are supposed to have come from Yap. The Yap natives built houses, towering structures for that part of the world. In Palao, to the westward, they improved on the architecture of Yap, while as one travels eastward to the Marshalls the structures become of decreasing simplicity.

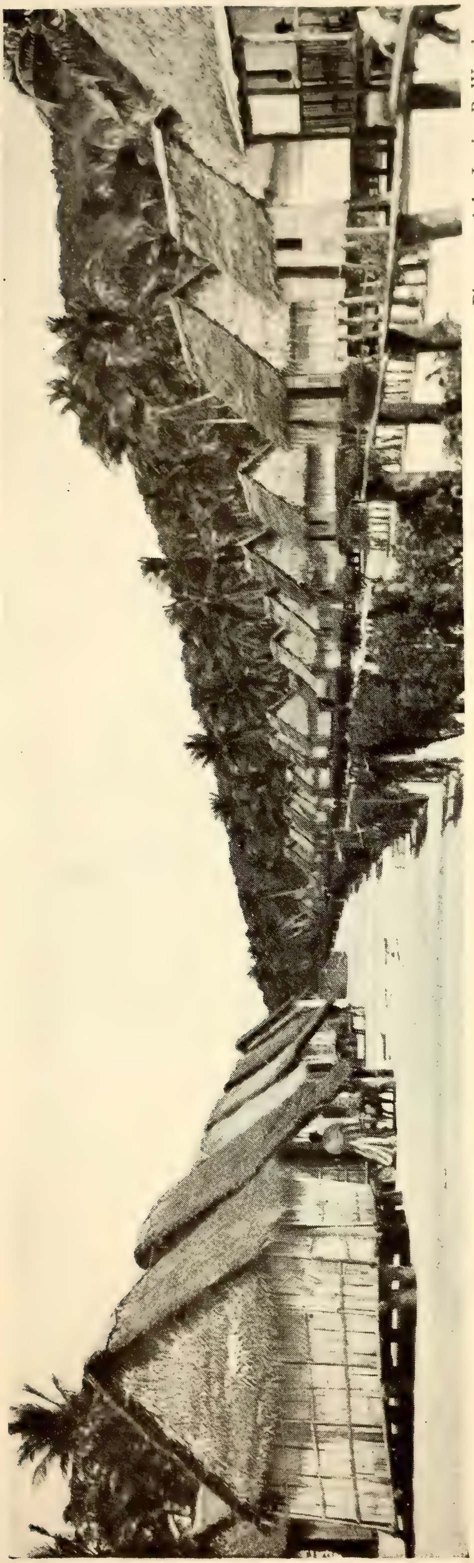
The natives of Yap knew how to make earthen bowls and cooking utensils, how to weave baskets and ornaments, and how to dye the fibers various colors. They had houses where only the chiefs met, club-houses where the unmarried men lived and which all the villagers could enter on certain occasions, and canoe-houses for the use of all. The same custom prevailed on the other islands.

In Yap the women cultivated the taro beds, and on the other islands they did the fishing. All agreed that the women should do the work and the men the fighting and loafing. With the advent of ships and trading, the men now work and the war canoes are leaking and decaying.

AN ISLAND OF STONE MONEY

Yap had a currency of its own—big circles of yellowish limestone which nobody could steal and smaller pieces of pearl shell with squared edges. They were brought from Palao, which gave them an intrinsic value. However, just as they discarded the fire-stick when matches were obtainable, the crude money is no longer used, except as ornaments or to sell to curio-collectors.

The big money resembled a flat grist-mill wheel with a hole in the center, so two men could carry it on a pole. Pieces four feet in diameter are numerous, and



Photograph by Junius B. Wood

MAIN STREET IN A VILLAGE OF ROTA: MARIANA ISLANDS

All the houses are elevated above the ground and have small windows under the overhanging thatch roofs, some of which extend out beyond the house to form a sort of porch. The woman in the foreground has spread mats on the sidewalk and is drying cocoa beans.

I was told that one wealthy and exclusive club had an 11-foot coin, but I could not find it. About two feet is the usual size. A three-foot coin could purchase a young pig; so the fortune-hunter could take his choice of paddling to Palao to quarry a piece of loose change and risk drowning while returning home, or of carefully raising a shoat.

The money, leaning against the elevated stone platforms of the clubs or homes of leading citizens, is practical as well as ornamental. The number and size of the piece mark the building's financial standing, and when visitors come they sit on the stone pavement, resting their backs against the stone cart-wheels, as they leisurely discuss club politics or the latest escapades of the village slave girls. The smaller shell money is now used for necklaces (see page 611).

Some of the club-houses in Yap are more than 100 feet long and 30 feet wide, built on platforms of rough stone paving. The roofs are striking—high and narrow, with the gable longer than the eaves, so that it projects several feet on each end. A similar type of architecture is followed in the more pretentious homes.

Posts and beams of the club-houses are carved and painted, usually in red, black, and white, with scenes historical of events on the island. In Palao, the club-houses are even more elaborate, the favorite ornamentation being a rude figure of a profusely tattooed woman straddling the door, as a warning to the village maidens to be circumspect. The natives' houses also are partitioned in a way, at variance with the usual one-room publicity.

THE WOMEN WEAR SMALL "HAYSTACKS"

The natives have built good roads in Yap, in most places well paved with stones. The women do all the work around the homes, but the men are sturdy workers and more efficient than those on any other of the islands.

Though they are anchored rather low, the skirts of the Yap women are longer than those of any other wearers of the garments of palm fiber and hibiscus bark. They reach to the ankles and are so full and fluffy that they look like small haystacks. The more fancy ones are dyed variegated colors (see page 612).

In Palao the women wear a double short skirt. The men of Yap wear a short shirt of the inner bark of the hibiscus over their loin-cloth, while those in Palao usually dispense with it. In a part of the world where the mother's hip serves as a baby carriage, the full skirt of Yap makes a convenient seat for the youngster. Even the smallest girls wear skirts.

Possibly the most important part of a Yap woman's apparel is a neck-string of thin native cord. This she puts on as soon as she is of marriageable age. Nothing else is worn above the waist, and it is considered brazenly immodest for a woman to appear without the cord around her neck. A long, thin comb of wood, which the men wear in their hair, shows similar distinction. A man's rank or standing in the community is indicated by the length of his comb. Some measure 18 inches.

Many learned pages have been written on whether the Yap natives, with their ingenuous ways, sufficient for their simple needs, or the Marshall islanders, with a semblance of Western customs imposed on their old habits and tropical atmosphere, are the more civilized. They are extremes geographically as well as extremes between the old and the new. The missionaries say that the Marshall islanders are both civilized and Christians.

TWENTY YEARS WITHOUT A MURDER IN THE MARSHALL ISLANDS

The Marshalls are proud of their record of twenty years without a murder and very few cases of theft. That is more than any American city of equal population and farther removed from days when head-hunting was popular can boast. The missionaries have taught the natives that they must not smoke, dance, play cards, cook on Sundays, drink liquor, or indulge in various other relaxations which are not considered an eternal bar to godliness in other lands. Calisthenics were abolished in the mission schools because the movements suggested the dances of their forefathers to the young people. As all these restrictions economize physical effort, the natives willingly accept them.

On the other hand, the population is said to have diminished 50 per cent in as many years, and the medical officers at the free hospital say that 90 per cent of their patients have venereal diseases and 60 per cent are also suffering with *frambesia tropica,* otherwise known as "yaws," which might be avoided if the rudiments of hygienic cleanliness were observed.

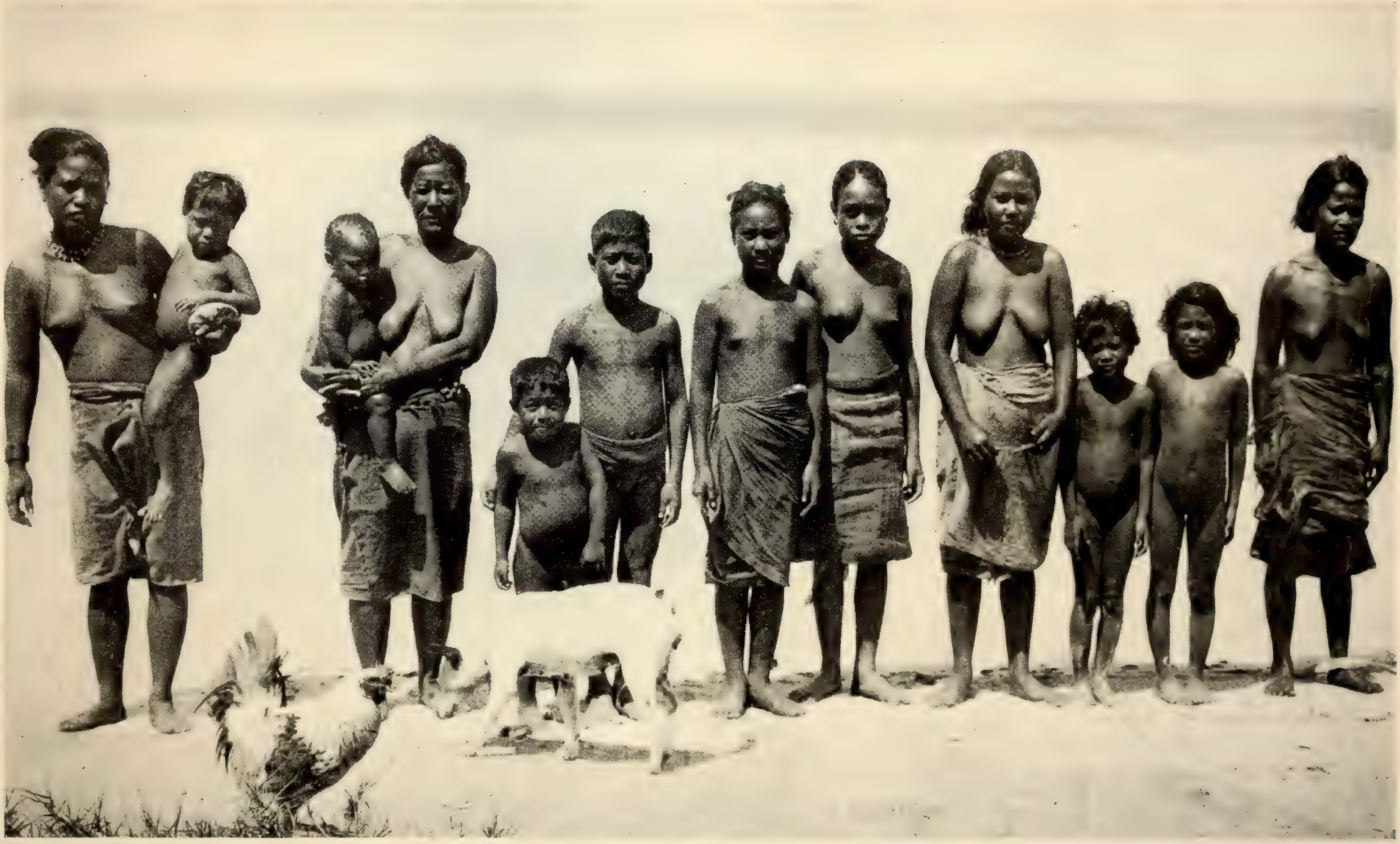
THE ANCIENT DANCE IS NO MORE

Though there is little to disturb their lassitude, the Marshall islanders are happy and contented. Most of them sit around their houses all day, have a song service in the evening, and then go to sleep.

Walk past a native house almost any hour of the day and two or three men or women can be seen lying on their backs in the cool interior. They will lazily roll their heads to look through the windows, opening on a level with the ground, to see who is passing, but more than mere curiosity is needed to dislodge them from their braided mats. It has been so long since there has been anything much to do that they have gotten out of the habit.

They do not have the vigor of their forefathers, when the men, working themselves into a frenzy in the war dance, dashed to their canoes to battle with the people of a neighboring island. Those were the days when the women danced the wild *rü-ong,* whose sinuous gyrations were the sensation of the South Seas. Four years of training, until her backbone was as flexible as a snake's, were required before a girl was permitted to join in this dance. In those days, to avoid argument, children traced their name and ancestry to their mother.

The chiefs and most of the men who have been educated in the mission schools have added a familiarity with foreigners



Photograph by Junius B. Wood

A BEACH PARTY ON SAIPAN: MARIANA ISLANDS

The original natives of Saipan were driven out of the island in 1815, but later it was repopulated by Chamorros and Caroline islanders.

and business methods to their native shrewdness. Many of them speak English, and, with their innate love of politics, deluge the visitor with questions on the outside world and international affairs, some of which are too complex for the ordinary traveler.

The years of missionary teaching in the islands have made the natives a peaceful, friendly, and hospitable people, and their even longer association with American and later Australian, German, and Japanese traders has given them a knowledge of values. It has been many years since a pink comb could be traded for a cask of coconut oil in the Marshalls.

"Yak we yuk" is the invariable greeting from man or woman. The salutation, "Love to you," may be taken to symbolize their daily spirit. They have seen much of Americans—rough sailors with pirate instincts, fighting and robbing; others who married their daughters and settled in the islands, and, finally, the gentle missionaries, who built schools and churches. America has taught them much, and they dream of America, far across the Pacific, as their adopted country.

"WHAT IS HAPPENING IN AMERICA?"

Possibly it is a chief, or a native preacher, or a man or woman who has studied in one of the mission schools, who always calls when an American visits one of the islands. A present of a gaily bordered mat, an assortment of artistically woven fans, a fish-hook made from shells, or some other native handicraft is always brought. And when the visitor leaves the baskets of fresh coconuts which are sent aboard his ship will quench his thirst for many days.

As clothes have become popular, tattooing has disappeared. Once a chief was tattooed from ears to waist, in fine lines of many designs, entirely different from the broad stripes of the Carolines. "Chief Moses" is the only survivor of that age, and though he now wears a high collar, his cheeks are lined as if they had been branded with an electric toaster.

Lebario, with nine atolls under his control, is another of the old chiefs, a grim, serious-minded man, whose life has registered all the changes in the Marshalls. My first sight of him was at Wotje. He was busily dictating a contract to his stenographer, a fat, middle-aged man with an ancient but effective typewriter. The captain of the Australian trading schooner was waiting to sign it, and Lebario was in a hurry, as the bi-monthly ship sailed for Jaluit in a few hours and he must catch it. However, he had time to stop all work and ask the invariable question, "What is happening in America?"

EVENINGS AT THE "CLUB" IN THE MARSHALL GROUP

Dramatic stories are told of the early days, only half a century ago, before the Marshall islanders became pupils of the Western World. Then these low-lying islands—more than 300, grouped into 32 circular atolls, with a total land area of only 156 square miles—were a world of their own, each atoll having its chief and usually at war with all its neighbors.

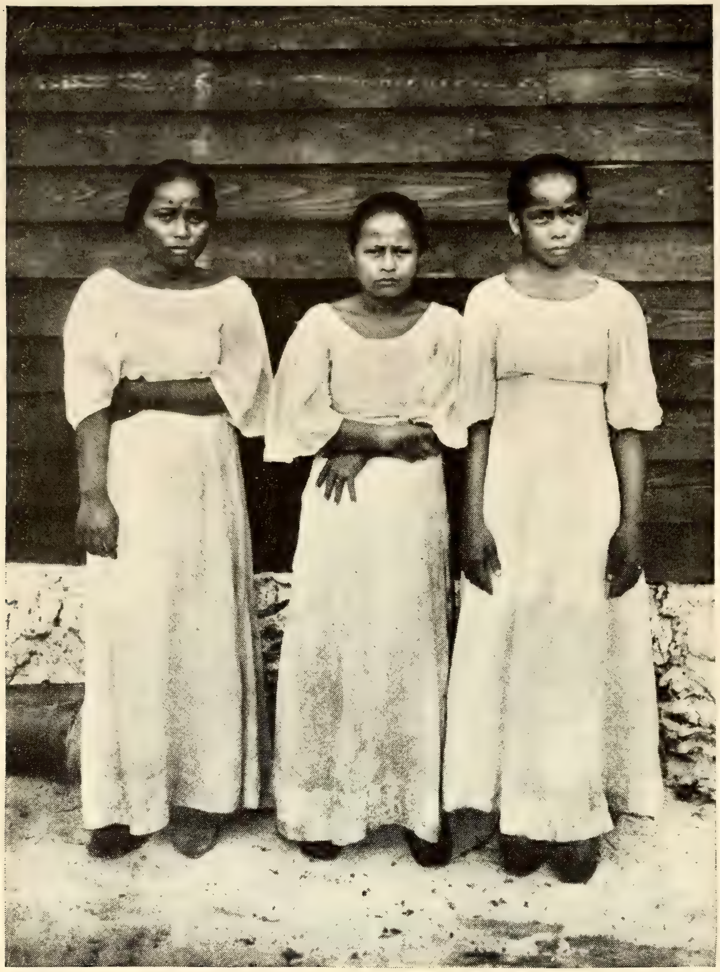
More than one night, when the moonlight was silvering the beach and the rest of the settlers slept, we sat until morning in the cabin of Joachim De Brum while old men reminisced of their boyhood.

Legends which their fathers handed down to them, love romances of island Cleopatras, and daring deeds of bold chiefs, stories of the rough characters who had come in later days, whispered locations of still buried treasures of tortoise-shell and gold, arguments of crops and prices of today—all were mixed in an incongruous medley. And, much like clubdom the world over, a sleepy boy would appear with an armful of coconuts, the "eyes" deftly extracted, for story-tellers and audiences always are thirsty.

De Brum is a remarkable character. Born on the islands, son of a Portuguese trader and native mother, subscriber to an American daily newspaper and several magazines, he keeps in touch with the greater world thousands of miles away, though the mail steamer never comes oftener than once in two months.

VALUABLE COPRA CROP PRODUCED BY THE MARSHALL ISLANDS

Life in the Marshalls today is denaturized and commercialized. The transformation came quickly, once it started. Though they were discovered by de Saavedra in 1529 and explored by Captain Marshall in 1788, it was not until 1886



Photograph from Junius B. Wood

GIRLS OF THE CHAMORRO TRIBE IN SAIPAN: MARIANA ISLANDS

The Chamorros are not of the same stock as the natives of the Carolines, but are probably allied with some of the Philippine tribes. They dress in European style and show a preference for white clothes. They also wear leather sandals, a style not common to any other South Sea islanders under Japanese control.

that Germany took possession of them as a colony.

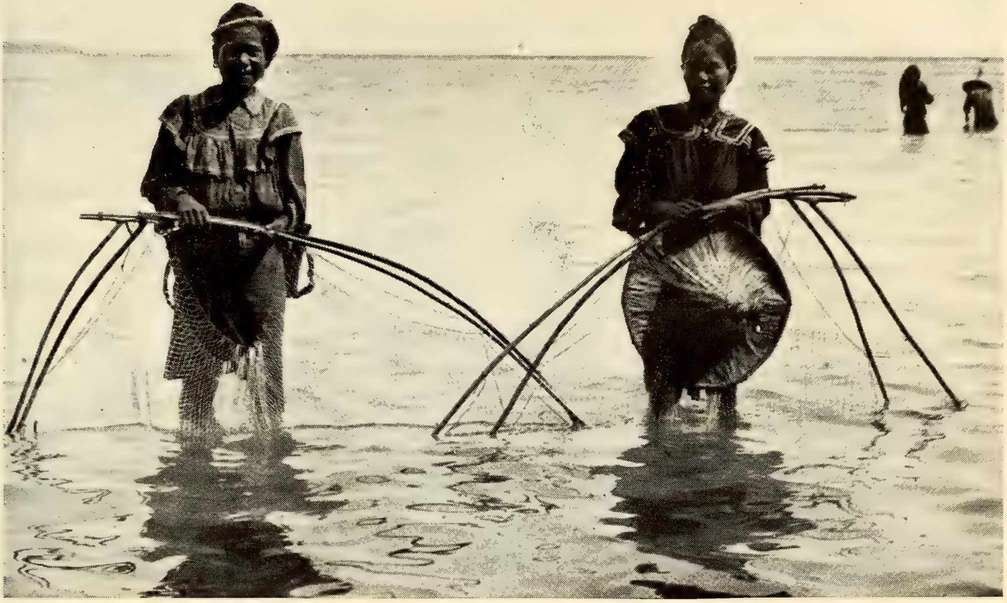
In a part of the world where men's wealth is measured by coconut trees, the Marshalls are a valuable asset to any country. They produce more than half the copra from the Japanese mandatory. Each island is a waving crown of palms. Periodically the fierce typoons strike this or that atoll, leveling the trees, decimating the inhabitants, or even lifting an entire island from its shallow bed on the coral reef, but the total producing power of the group is hardly affected. In five or six years new trees have grown, and those of the inhabitants who temporarily migrated in search of food and shelter return to their home island.

While the Marshalls are entirely low coral islands, the Carolines are both volcanic and coral and the Marianas are entirely basaltic, five of the Marianas—fifteen in number when Guam is included—having active volcanoes. One diligent statistician has located 680 islands in the Carolines, divided into forty-eight clusters. These latter are what show on maps as individual islands.

PLETHORA OF NAMES FOR EACH ISLAND

Truk or Ruk, meaning "mountain" in the native language, where the Japanese naval headquarters administering the mandatory is located for the present, is the largest of the clusters. It consists of eleven volcanic islands, one of which is four miles across, and some 80 coral islands, most of them extremely small, all surrounded by a roughly circular reef 35 miles in diameter. About half the little islands are on this reef, and the remainder are scattered in the big lagoon, which can be navigated by the largest ships (**see map, page 648**).

The Japanese have followed the practice of the men of other nations, who ruled for a day or a year over the islands, and have given Truk a new crop of names. Nearly every island in the Carolines has a Portuguese, Spanish, Russian, French, English, American, or German name in addition to its assortment of native titles.



Photographs by Junius B. Wood

FISHING IN DEEP WATER IN A WRAPPER AND A LARGE CONICAL HAT MUST HAVE ITS COMPLICATIONS

Since being introduced to this passé garment of civilization, the native women make peculiar use of it. They can scarcely be persuaded to dispense with it when they go fishing. In some of the islands they keep it strictly as a town gown, which they don on the road when they get in sight of the houses of the settlement (see text, page 599).

Mariners' charts, compiled mostly from data of the American missionary schooner *Morning Star* or English surveys, are fairly impartial to all nations, but many other names are used by sojourners in the islands.

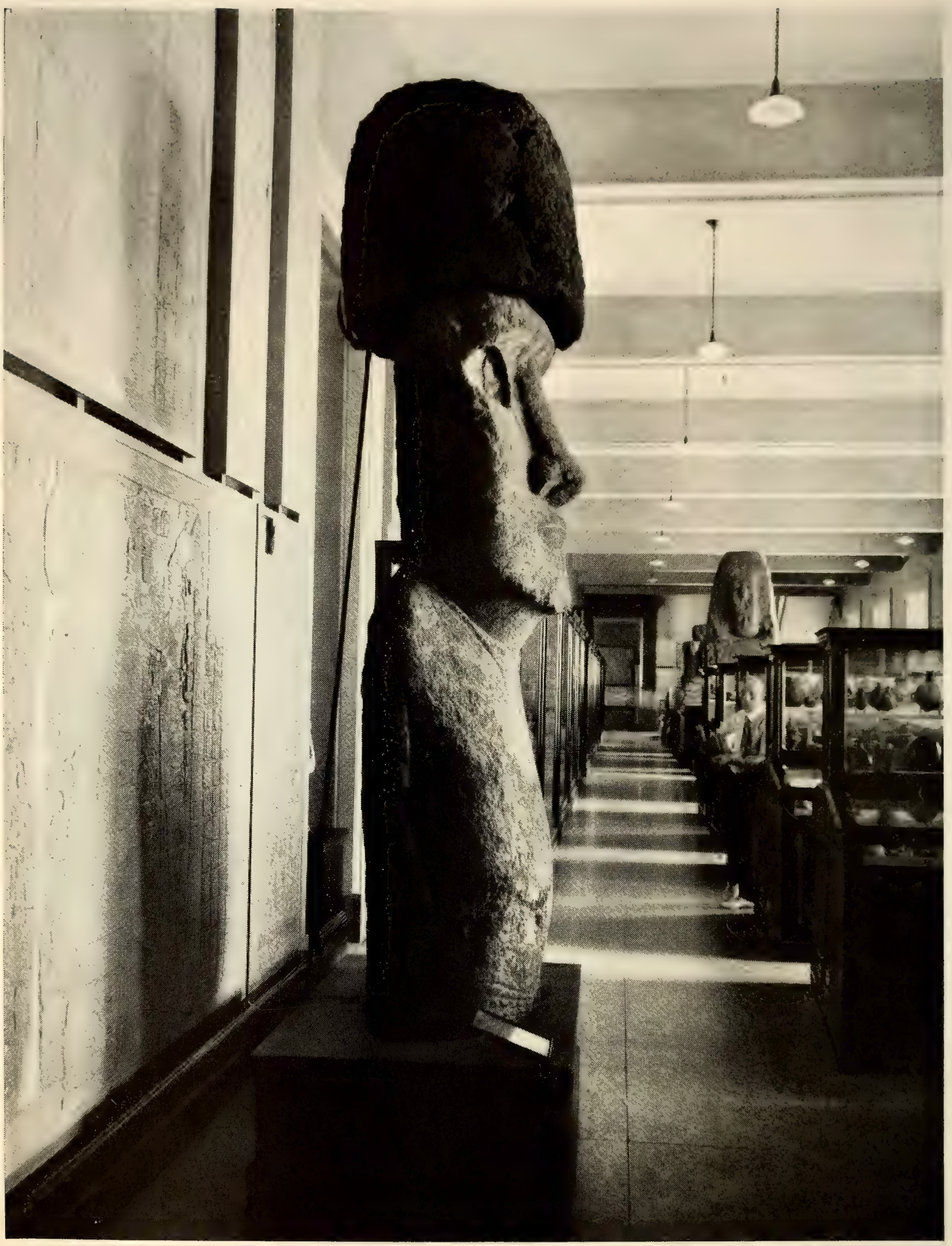
Though they show as yet only on official communications, the Japanese have renamed the eleven larger islands in Truk after the seven days of the week and the four seasons, those on the reef after signs in astrology and palmistry, and the small ones inside after flowers.

The three groups in prehistoric ages may have formed parts of two mountain ranges of which the peaks still are above the waves in the Carolines and Marianas, while only the encircling reef of the tireless coral remains in the Marshalls.

The natives of the Marianas differ physically from the natives in the Carolines and Marshalls. Many show traces of European blood and their language includes expressions from the Tagalog and Spanish of the Philippines, possibly traced to the days when Spain ruled the islands. Many of their homes in Saipan are large and comfortable, in European style, with pianos and other furniture which is not found farther south.

The Kanakas, as the natives of the Carolines and Marshalls are called, who also are in Saipan, retain their native customs — absence of clothes, chiefs' houses, dances to the full moon, and an entirely lower plane of existence.

Tribal wars, with victories measured in the number of warriors' heads and women captured, mixed the blood on the islands long before the white men came, and since that time migration has been easy and safe, until racial characteristics are blended and indistinct.



Photograph Courtesy of U. S. National Museum

ONE OF THE STONE IMAGES FROM EASTER ISLAND

The Easter Island images are the most interesting of archeological enigmas. There are more than 600 on the island. Formerly many of them stood in groups of from 6 to 12 on platforms of hewn stone facing the sea. They were hewn out of volcanic tufa and transported, sometimes three or four miles, to their destination. The island is almost treeless, and the wonder is how the image-makers could remove objects so fragile as these, weighing from three to thirty tons each, over ground so rugged. The images exhibited in the U. S. National Museum were secured during a 12-day visit to the island in 1886 by the U. S. Ship *Mohican,* under Commander B. S. Day, U. S. N.

THE MYSTERY OF EASTER ISLAND

BY MRS. SCORESBY ROUTLEDGE

*With Illustrations from Photographs by Members of the Author's Expedition**

"ALL the seashore is lined with numbers of stone idols, with their backs turned towards the sea, which caused us no little wonder, because we saw no tool of any kind for working these figures."

So wrote, a century and a half ago, one of the earliest navigators to visit the Island of Easter, in the southeast Pacific.

Ever since that day passing ships have found it incomprehensible that a few hundred natives should have been able to make, move, and erect numbers of great stone monuments, some of which are over thirty feet in height; they have marveled and passed on.

As the world's traffic has increased, Easter Island has still stood outside its routes, quiet and remote, with its story undeciphered.

What were these statues of which the present inhabitants know nothing? Were they made by their ancestors in forgotten times or by an earlier race? Whence came the people who reached this remote spot? Did they arrive from South America, 2,000 miles to the eastward, or did they sail against the prevailing wind from the distant islands to the west? It has even been conjectured that Easter Island is all that remains of a sunken continent.

Fifty years ago the problem was increased by the discovery on this mysterious land of wooden tablets bearing an unknown script; they, too, have refused to yield their secret (see page 646).

HOW TO REACH EASTER ISLAND

When, therefore, we decided to see the Pacific before we died, and asked the anthropological authorities what work there remained to be done, the answer was, "Easter Island."

It was a much larger undertaking than had been contemplated; we had doubts of our capacity for so important a venture; and at first the decision was against it, but we hesitated and were lost.

Then followed the problem, how to reach the goal. The island belongs to Chile, and the only regular communication, if regular it can be called, was a small sailing vessel sent out by the Chilean Company, which uses the island as a ranch. This vessel went sometimes once a year, sometimes not so often, and only remained there sufficient time to bring off the wool crop.

We felt that the work on Easter ought to be accompanied with the possibility of following up clues elsewhere in the islands, and that to charter any such vessel as could be obtained on the Pacific coast, for the length of time we required her, would be unsatisfactory, both from the pecuniary standpoint and from that of comfort. It was therefore decided, as my husband is a keen yachtsman, that it was worth while to procure in England a little ship of our own, adapted to the purpose, and to sail out in her.

NO SHIP TO BE FOUND, ONE IS BUILT

Search for a suitable vessel in England was fruitless, and it became clear that to get what we wanted we must build. The question of general size and arrangement had first to be settled, and then matters of detail. It is unfortunate that the precise knowledge which was acquired of the exact number of inches necessary to sleep on, to sit on, and to walk along is not again likely to be useful. The plans were completed for a vessel of schooner rig and auxiliary motor power. The length over all was 90 feet and the water line 72 feet; her beam was 20 feet. The gross tonnage was 91 and the yacht tonnage was 126.

While the plans were being completed, search was being made for a place where the vessel should be built; for, though nominally a yacht, such finish and build would have been out of place. It had been decided that she should be of wood,

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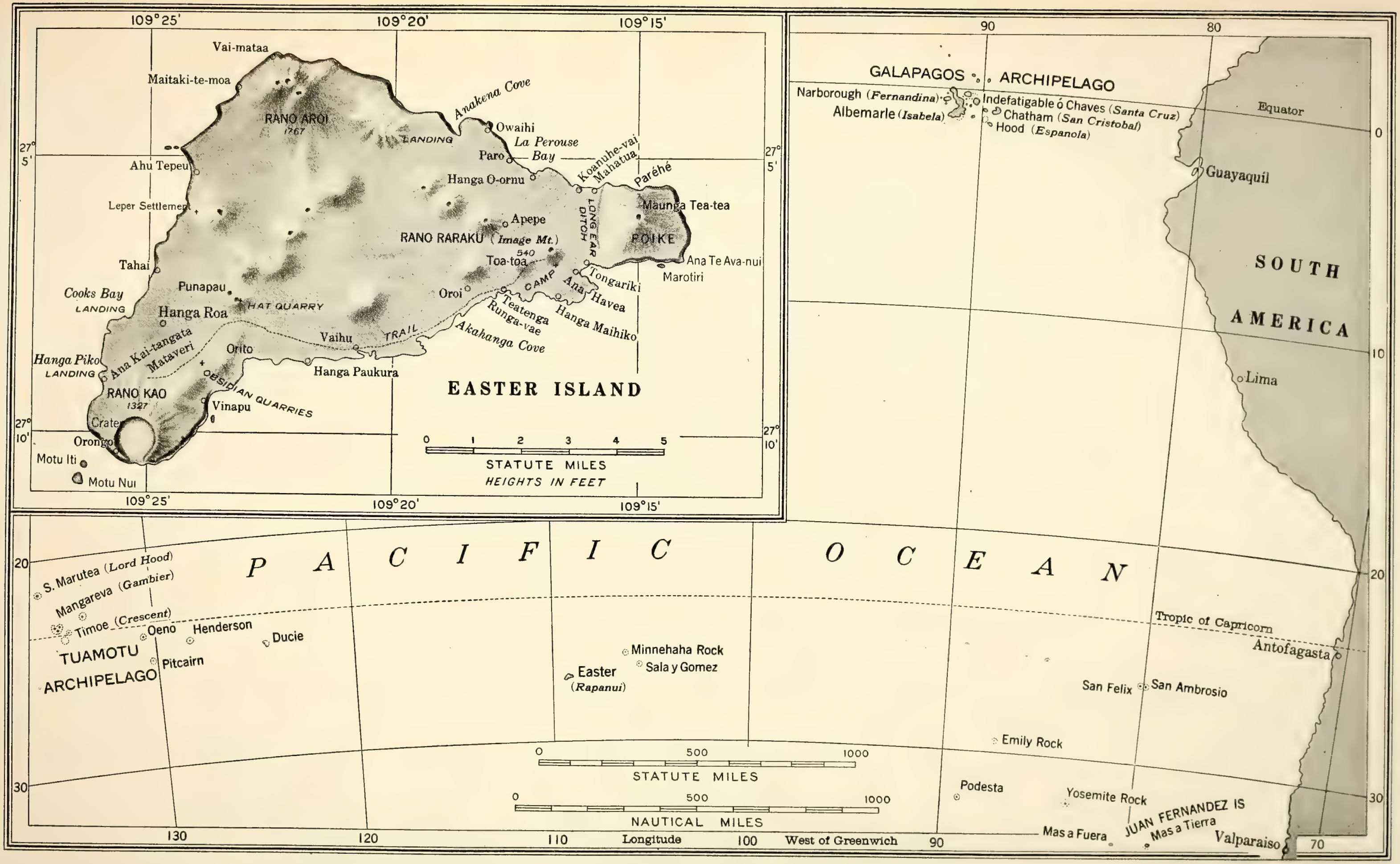
*A more detailed account of the findings of the Routledge Expedition will be found in the fascinating and handsomely illustrated volume, "The Mystery of Easter Island," by Mrs. Scoresby Routledge, sold by Sifton, Praed & Co., London.



Drawn by A. H. Bumstead

A MAP OF EASTER ISLAND

Easter Island lies more than 2,000 statute miles west of the nearest point on the South American coast and nearly 1,000 miles east of the most easterly of the Tuamotu Archipelago (see large map supplement with this number of THE GEOGRAPHIC). It is of volcanic origin and has an area of about 50 square miles. The ahu designated on the coast-line are the burial platforms on which stood many of the island's mysterious stone images (see page 636).

as easier to repair in case of accident, where coral reefs and other unseen dangers abound; but the building of wooden walls had practically ceased.

The west country was visited and an expedition made to Dundee and Aberdeen; but even there, the old home of whalers, ships are now built of steel. Finally we fixed on Whitstable, from which place such vessels still ply round the coast.

THE SHIP IS CHRISTENED THE "MANA"

The keel was laid in the autumn. The following spring we took up our abode there to watch over her, and in May she first took the water, being christened by the writer in approved fashion: "I name this ship *Mana,* and may the blessing of God go with her and all who sail in her"—a ceremony not to be performed without a lump in the throat.

The choice of a name had been difficult. We had wished to give her one borne by some ship of Dr. Scoresby, the Arctic explorer, a friend of my husband's family, whose name he received; but none of them proved to be suitable.

The object was to find something which was both simple and uncommon. All appellations that were easy to grasp seemed to have been already adopted, while those that were unique lent themselves to error.

"How would it do in a cable?" was the regulation test. Finally we hit on *Mana,* which is a word well known to anthropologists and has the advantage of being familiar throughout the South Seas.

We generally translated it, somewhat freely, as "good luck." It means, more strictly, supernatural power. A Polynesian would, for instance, describe the common idea of the effect of a horseshoe by saying that the shoe had "mana." From a scientific standpoint, mana is probably the simplest form of religious conception.

. . . .

EASTER ISLAND SIGHTED AFTER A VOYAGE OF 13 MONTHS

Easter Island at last! It was in the misty dawn of a Sunday in March that we first saw our destination, just one week in the year earlier than the Easter Day it was sighted in 1722 by Roggeveen and his company of Dutchmen. We had been twenty days at sea since leaving Juan Fernandez (Robinson Crusoe's Island), giving a wide berth to the few dangerous rocks which constitute Sala y Gomez and steering directly into the sunset.

It was thirteen months since we had left Southampton, out of which time we had been 147 days under way, and here at last was our goal. As we approached the southern coast we gazed in almost awed silence at the long gray mass of land, broken into three great curves and diversified by giant molehills. The whole looked an alarmingly big land in which to find hidden caves.

The hush was broken by the despairing voice of Bailey, the ship's cook. "I don't know how I am to make a fire on that island; there is no wood!" He spoke the truth; not a vestige of timber or even brushwood was to be seen.

THE FIRST MEAL ON EASTER ISLAND

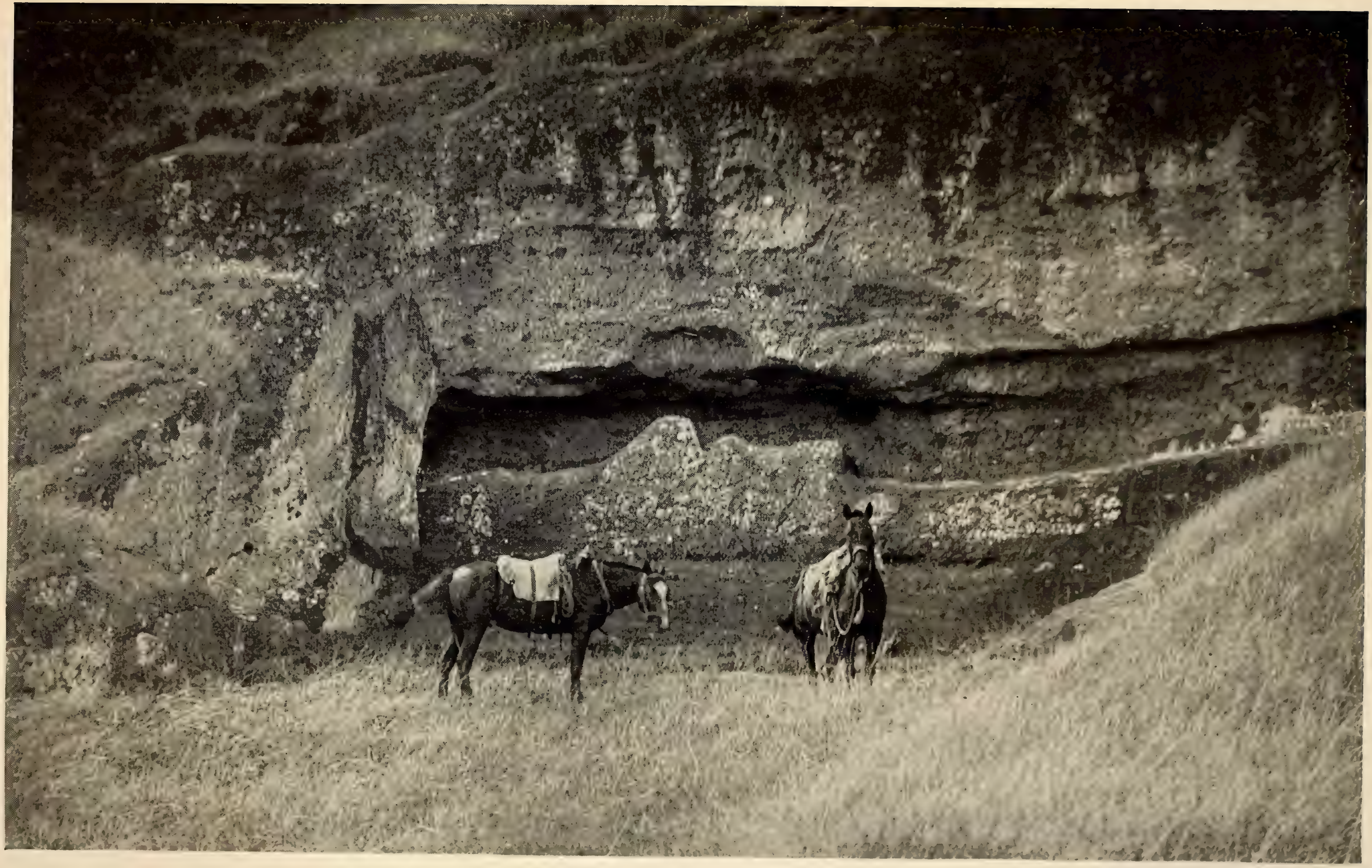
We swung round the western headland, with its group of islets, and dropped anchor in Cooks Bay. A few hundred yards from the shore is the village of Hanga Roa, the native name for Cooks Bay. This is the only part of the island which is inhabited, the 250 natives, all that remain of the population, having been gathered together here in order to secure the safety of the live stock, to which the rest of the island is devoted.

The yacht was soon surrounded by six or seven boat-loads of natives, clad in nondescript European garments, but wearing head-coverings of native straw, somewhat resembling in appearance the high hat of civilization.

The manager, Mr. Edmunds, shortly appeared, and to our relief, for we had not been sure how he would view such an invasion, gave us a very kind welcome. He is English and was, to all intent, at the time of our arrival, the only white man on the island; a French carpenter, who lived at Hanga Roa with a native wife, being always included in the village community.

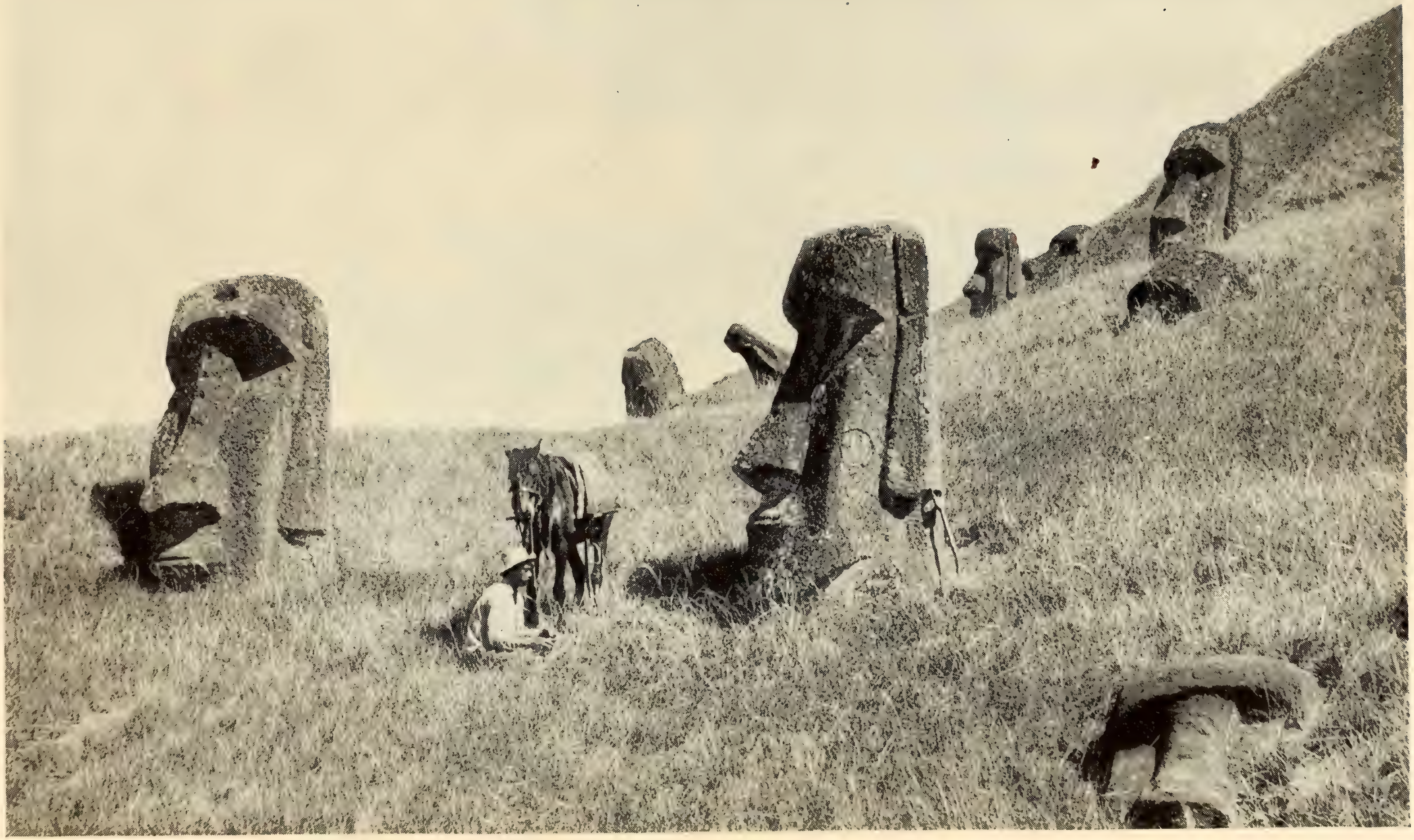
Mr. Edmunds' house is at Mataveri, a spot about two miles to the south of the village, surrounded by almost the only trees on the island; immediately behind it rises the swelling mass of the volcano Rano Kao (see map, page 630).

The first meal on Easter Island, taken



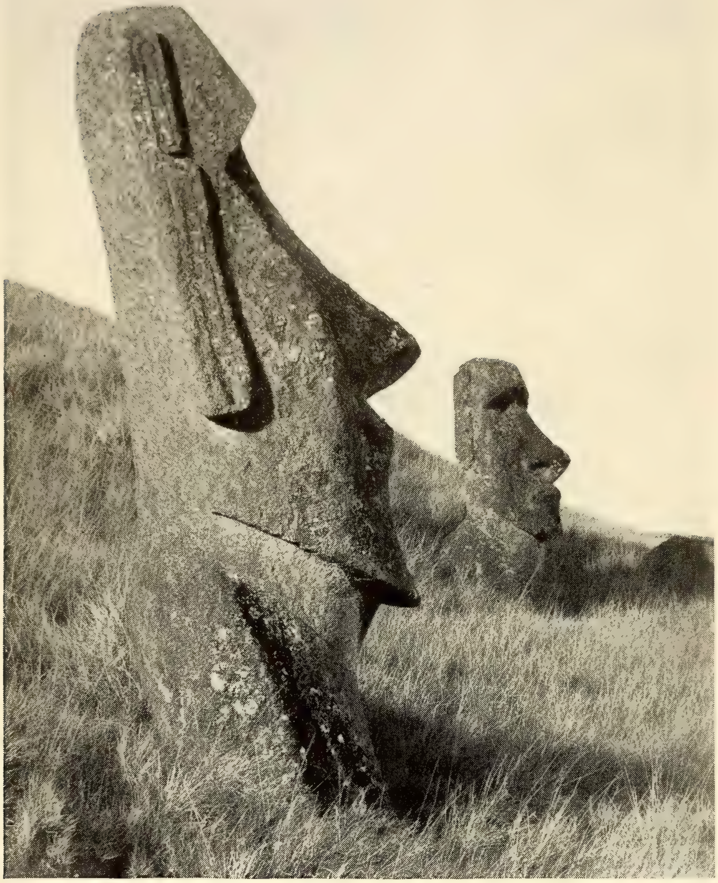
A PARTIALLY SCULPTURED IMAGE IN ONE OF THE QUARRIES ON RANO KAO VOLCANO: EASTER ISLAND

The quarry statues on Easter Island, in various stages approaching completion, number 150. The surface of the rock which was supposed to furnish the figure had generally been laid bare before work upon it began, but occasionally the image was wrought lying partially under a canopy, as in the case illustrated here (see text, pages 643-645).



STANDING STATUES ON RANO RARAKU VOLCANO: EASTER ISLAND

Every statue here is buried in greater or less degree, but while some are exposed to the elbow, only a portion of the head is visible in other cases. Still other images probably are completely covered and remain to be excavated. Note the rope-like ear (see also illustration on page 634).



TWO STATUES ON THE SLOPES OF RANO RARAKU

The image in the foreground shows clearly one of the remarkable features of these statues—the lobe of the ear—which, in general, is depicted as a fleshy rope.

here with Mr. Edmunds, remains a lasting memory. It was a large, plain room with uncarpeted floor, scrupulously orderly; a dinner table, a few chairs, and two small book-cases comprised the furniture.

The door on to the veranda was open, for the night was hot, and the roar of breakers could be heard on the beach, while near at hand conversation was accompanied by a never-ceasing drone of mosquitoes.

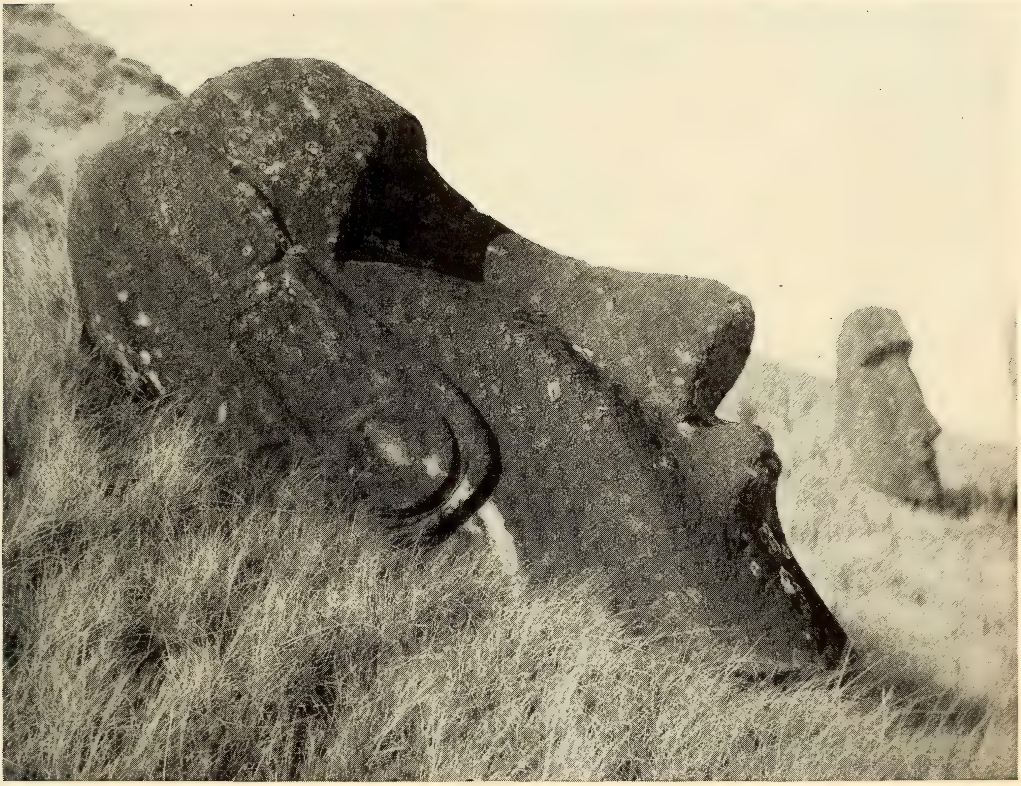
The light of the unshaded lamp was reflected from the clean, rough-dried cloth of the table round which we sat, and lit up our host's features, the keen brown face of a man who had lived for some thirty years or more, most of it in the open air and under a tropical sun.

He was telling us of events which one hardly thought existed outside magazines and books of adventure, but doing it so quietly that, with closed eyes, it might have been fancied that the entertainment was at some London restaurant and we were still at the stage of discussing the latest play.

"This house," said our host, "was built some fifty years ago by Bornier, who was the first to exploit the island. He was murdered by the natives. They seized the moment when he was descending from a ladder; one spoke to him and another struck him down. They buried him on the hillock near the cliff, just outside the plantation. You will see his grave when the grass is not so long; it is marked by a circle of stones.

"A French warship arrived almost immediately afterwards, the natives explained that he had been killed by a fall from his horse, and this is the version still given in some of the accounts of the island; but murder will always out.

"After that another manager had trouble; it was over sheep-stealing. There were three or four white men here at the time, and they all rode down to the village to teach the natives a lesson; but the ponies turned restive at the sound of gunfire, and the rifles themselves were defective; so the boot was on the other foot, and they had to retreat up here, followed by the mob. For months they lived in



AN IMAGE ON RANO RARAKU WITH A DISK EAR

This peculiarity of the lobe is much less common among the Easter Island images than that shown on the opposite page.

what was practically a state of siege, with one man always on guard for fear of attack.

THE STORY OF A SHIPWRECK

"My latest guests were a crew of shipwrecked mariners, Americans, who landed on the island last June. A fortnight earlier the barometer here had been extraordinarily low, but we did not get much wind; further to the south, however, the gale was terrific, and the *El Dorado* was in the midst of it.

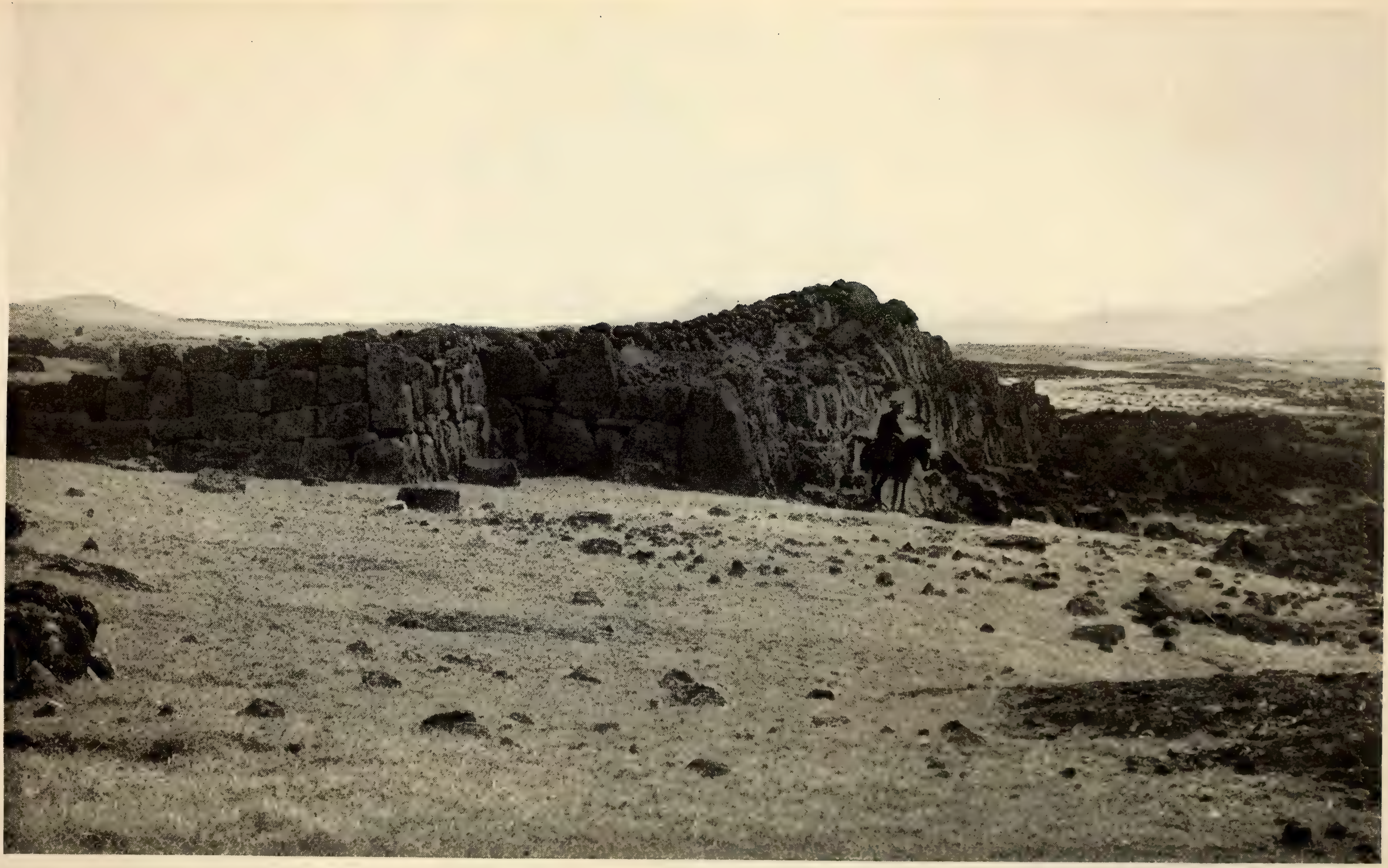
"The captain, who had been a whaler in his day, said that he had never seen anything approaching it. The sea was simply a seething mass of crested waves.

"The ship was a schooner, trading between Oregon and a Chilean port; she was a long way from land, as sailing vessels make a big semicircle to get the best wind. She had a deck-load of timber, 15 feet high, which, of course, shifted in such a sea; she sprang leaks in every direction, and it was obvious that she must soon break up.

"The crew took to their boat, not that they had much hope of saving their lives, but simply because there was nothing else to be done. They got some tins of milk and soup on board, and a box of biscuits, and a cask holding, perhaps, twenty gallons of water. The captain managed to secure his sextant, but when he went back for his chronometers the chart-room was too deep in water for him to be able to reach them.

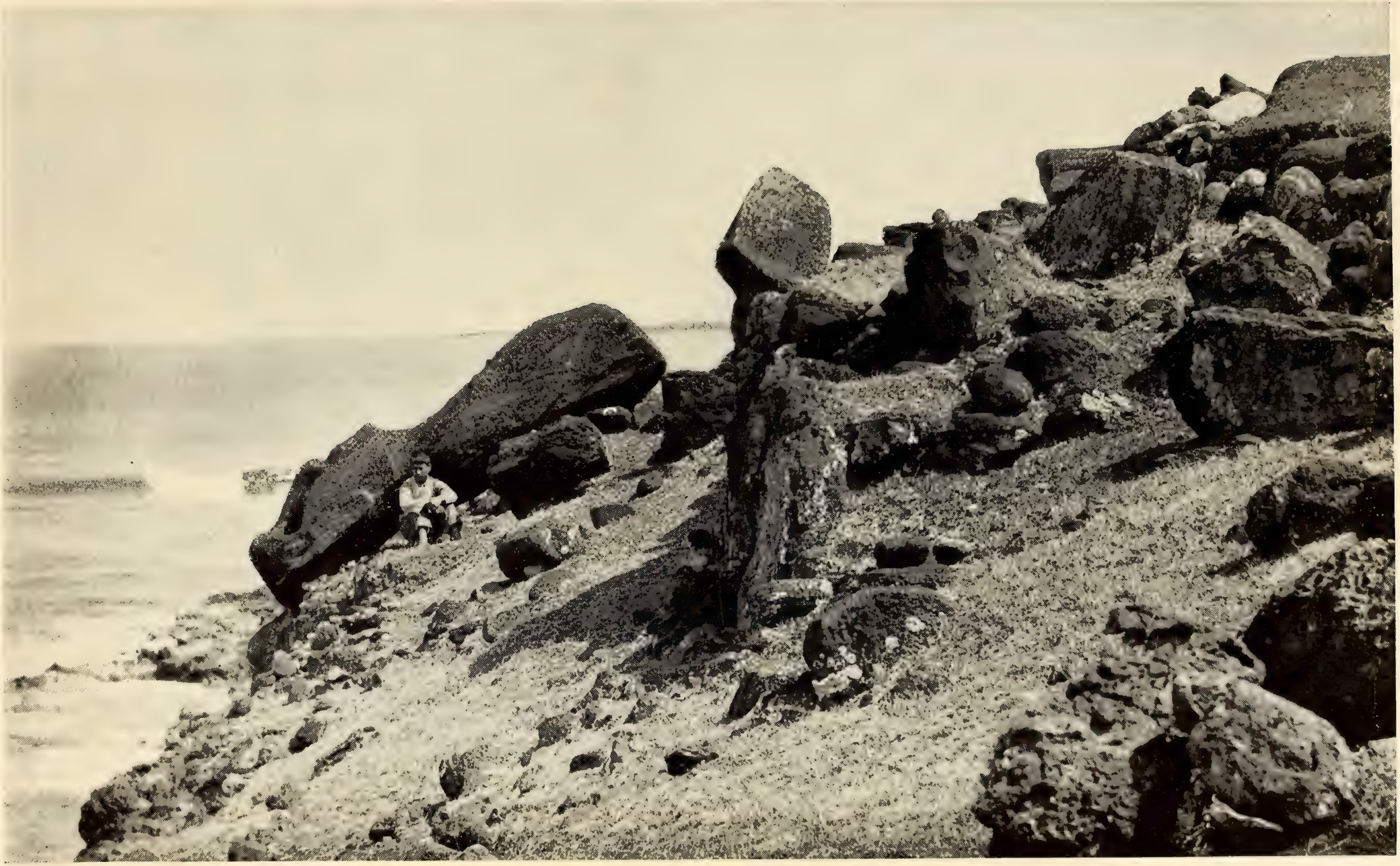
IN AN OPEN BOAT 700 MILES FROM LAND

"They saw by the chart that the nearest land was this island; it was 700 miles off, and, as they had no chronometer and could take no risks, they would have to go north first in order to get their latitude, which would add on another 200. There was nothing for it, however, but to do the best they could; they had more gales, too, and only saved the boat from



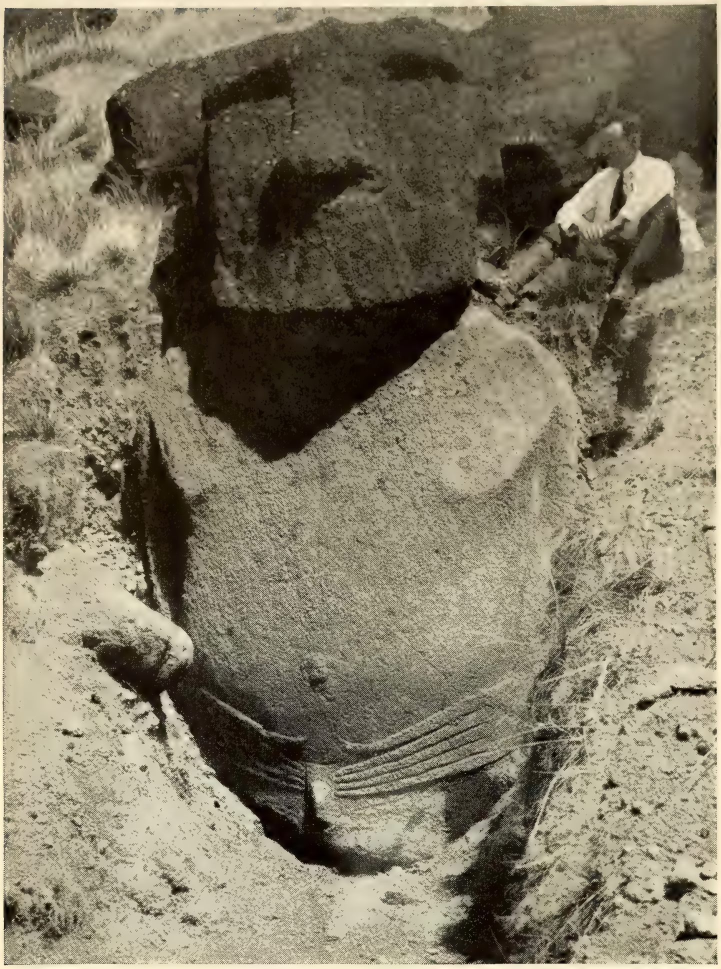
THE SEAWARD SIDE OF ONE OF THE EASTER ISLAND BURIAL PLACES, AHU MAHATUA

These impressive piles of stone are supposed to have been erected by prehistoric Easter Islanders as resting places for their dead. They are known as ahu and are found chiefly near the seacoast. On these burial platforms stood most of the great images that amazed the early voyagers. For the plan of their construction, see diagram, page 644.



ONE OF THE GIANT STATUES WHICH HAS FALLEN BACKWARD FROM A BURIAL PLATFORM

This ahu, at Runga-Vae, on the south coast, was undermined by the sea, causing the image to topple over.



AN EXCAVATED STATUE ON EASTER ISLAND

This unusual specimen shows the form of the hands. Here the position of the eyes is indicated by a straight line below the brow. In the images found on the terraces the sockets are always hollowed out (see illustration, page 628).

being swamped by making a sea-anchor of their blankets.

"The spray, of course, kept washing over them, and as the boat was only 20 feet long and there were eleven of them, there was no room for them to lie down. Each day they had between them a tin of the soup and one of milk and an allowance of water, but the sea got into the water-cask and made it brackish, and before the end their sufferings from thirst were so great that one or two of them attempted to drink salt water. The mate stopped that by saying that he would shoot the first man who did it.

"After nine days they sighted this island; but then luck was against them, for the wind changed, and it was 48 hours after they saw the coast before they were able to beach the boat. They got on shore at the other end of the island, which is uninhabited.

"They were pretty much at the last stage of exhaustion and their skin was in a terrible condition from salt water; their feet especially were so bad that they could hardly walk.

"One of them fell down again and again, but struggled on, saying, 'I won't give up, I won't give up.' At last my man, who looks after the cattle over there, saw them and brought me word. The officers were put up here—you must really forgive the limitations of my wardrobe, for I had to give away nearly everything that I had in order to clothe them.

"The most curious part of the whole business was that after they had been here three or four months the captain took to the boat again. I believe that he was buying his house at home on the installment plan, and that if he did not get in the last payment by the end of the year the whole would be forfeited.

"Anyway, as soon as the fine weather came on he had out the boat and patched her up. He got two of his men to go with him. I lent him a watch for navigation purposes, and we did all we could for him in the way of food; there were no matches on the island, so he learned how to make fire with two pieces of wood, native fashion. Off he started last October for Mangareva, 1,600 miles from here [see map supplement]; he must have got there safely, for you brought me an answer to a letter that I gave him to post." *

CONDITIONS OF LIFE ON EASTER ISLAND

Easter is a volcanic land, and in the earlier days of the world's history great lights and flowing lava must have gleamed across the expanse of water, then gradually lessened and died away, leaving their work to be molded by wind and tide. The island, as the forces of nature have thus made it, is triangular in shape and curiously symmetrical.

The length of the base—that is, of the southeast coast—is about 13 miles and the greatest width about 7 miles; the circumference, roughly speaking, is 34 miles.

The apex, which is the highest ground, is a volcano having an elevation of more than 1,700 feet. Its summit is formed of a cluster of small craters; the eastern and western angles are each composed of a large extinct volcano (see map, page 630).

The place is geologically young, and the mountains, in contrast to those of Juan Fernandez, still preserve their original rounded shapes; there are no ravines, no wooded precipices, no inaccessible heights, but round the whole coast erosion is at work, with the result that, while on the land side the slopes of all these three mountains are gradual, on the sea side—that is, in portions of the north, east, and west coasts—they have been worn back by the power of the waves into imposing cliffs.

In some instances the crater of a mountain has become a lake. These lakes are almost the only water supply of the island; there is a good rainfall, but no single running stream. Owing to the porous nature of the ground, the water sinks beneath the surface, sometimes forming underground channels, from which it flows into the sea below high-water mark, thus giving rise to the curious statement of early voyagers, that the natives were able to drink salt water.†

The lower portions of the island are composed of sheets of lava, in process of disintegration, across which walking is almost impossible and riding a very slow process. The surface of the mountains and hills is smoother, being volcanic ash. The whole is covered with grass, which sprouts up between the masses of lava and gives the hills a delightful down-like appearance. Forest growth has probably never consisted of more than brushwood and shrubs, and today even those have disappeared.

A NEARLY PERFECT CLIMATE

Easter Island lies in the subtropics, and, if the question of wind be eliminated, the climate is as nearly perfection as possible in this world. There may be, especially in the winter months, a spell of three or four days of rain, or a wind from the Antarctic, when woolen clothes are welcome; and occasionally, in the summer, it is preferable to be indoors during the noontide hours; but, with these exceptions, it is one of those rare localities where it is possible to be warm the whole year round, and yet to utilize to the full the hours of daylight.

There are, as might be expected, too many insects; cockroaches abound, out of doors and under statues, as well as in houses and tents. The only consolation is that they are of a handsome, red variety and not shiny black. Flies also are numerous; I have counted two hundred in a bowl of soapy water and six or eight at once on my hand while busy writing. Mosquitoes, which had been imported, varied in their attentions. When they were at their worst, it was necessary to wear headgear and dine in gloves.

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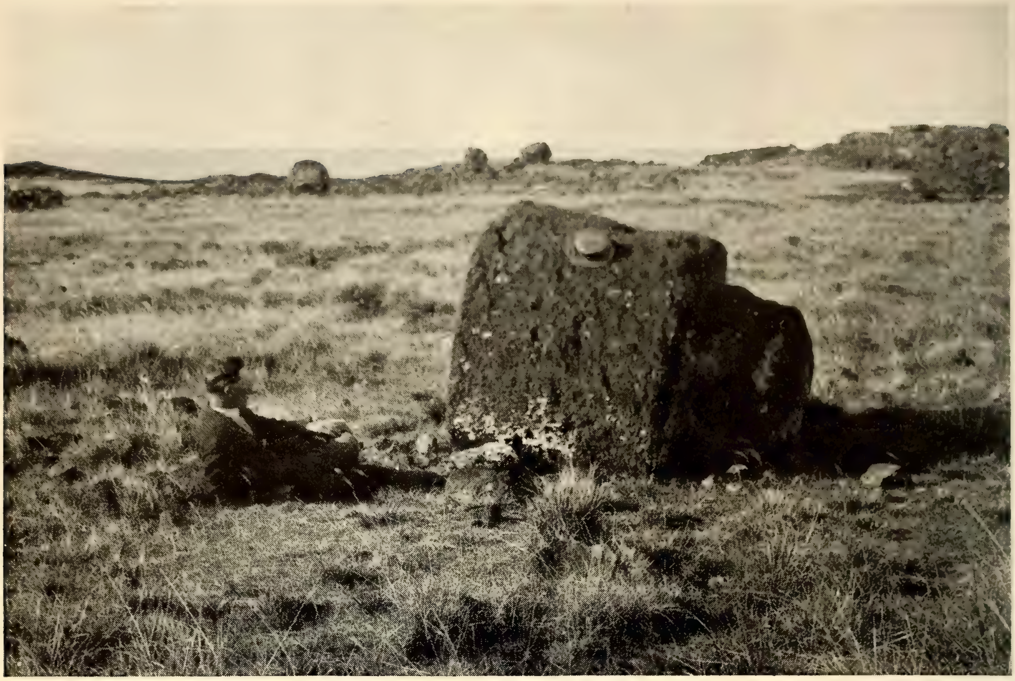
* Captain Benson and his crew made the voyage in the ship's boat to Mangareva in 16 days, and after two days' rest left in the same manner for Tahiti, accomplishing the farther 900 miles in 11 days. Mr. Richards, the British consul at the latter place, told us later of his astonishment when, in answer to his question whence the crew had come, he received the amazing reply, "Easter Island."

† In the *Journal of the Ethnological Society* the Bishop of Wellington, in his "Notes on the Maoris and Melanesians," says: "I will only add this one word about the curious way in which they get fresh water on some of the coral islands, such as Nangone, where there is none on the surface. Two go out together to sea and dive down at some spot where they know is a fresh-water spring, and they alternately stand on one another's backs to keep down the one that is drinking at the bottom before the pure water mixes with the surrounding salt water."



A STONE HAT FOR ONE OF THE IMAGES

These coverings are cylindrical in form, the bottom being slightly hollowed out into an oval depression in order to fit on the head of the image. The brim projected over the eyes of the figure—a fashion common in native head-dresses. The material of these hats is red volcanic tufa, found in a small crater of a volcano near Cooks Bay. The finished hats are from 4 to 10 feet in height, with additions of 6 inches to 2 feet for the knobs. They measure from 5½ to 8 feet across (see the hat on the image illustrated on page 628).

There is said to be no fever in the islands. We had two or three attacks, but it may have been "original sin." Once we had a plague of little white moths, and occasionally, for a short while, visitations of a small flying beetle, whose instinct seemed to be to crawl into everything, making it safer to stuff one's ears with cotton wool. On these occasions dinner had to be cooked early, owing to Bailey's pathetic complaint, that, with a lamp burning in the kitchen, business was rendered impossible from the crowds which committed suicide in the soup.

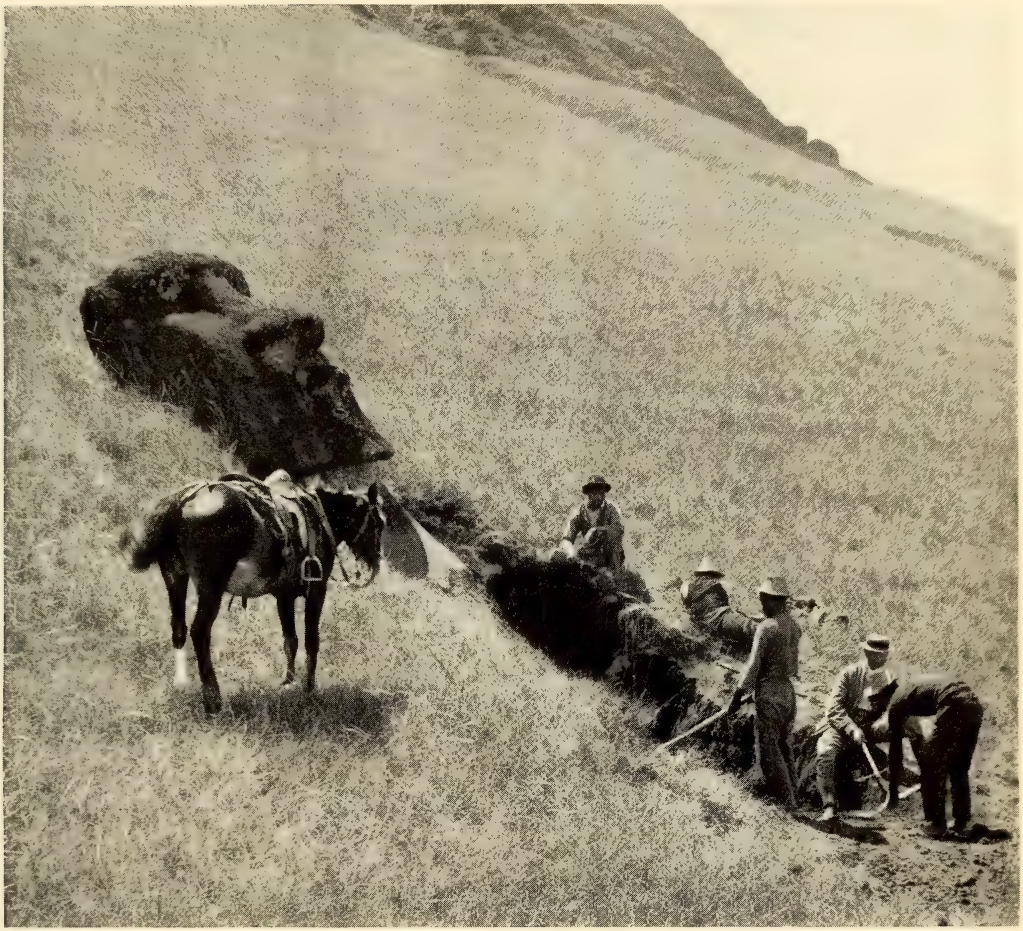
Easter Island bears no resemblance to the ideal lotus-eating lands of the Pacific. Rather, with its bleak, grass-grown surface, its wild rocks and restless ocean, it recalls some of the Scilly Isles or the coast of Cornwall. It is not a beautiful country, nor even a striking one, but it has a fascination of its own. All portions of it are accessible; from every part are seen marvelous views of rolling country; everywhere is the wind of heaven; around and about all are boundless sea and sky, infinite space and a great silence.

The dweller there is ever listening for he knows not what, feeling unconsciously that he is in the antechamber to something yet more vast which is just beyond his ken.

PREHISTORIC REMAINS OF EASTER ISLAND

In many places it is possible, in the light of great monuments, to reconstruct the past. In Easter Island the past is the present; it is impossible to escape from it. The inhabitants of today are less real than the men who have gone; the shadows of the departed builders still possess the land.

Voluntarily or involuntarily, the sojourner must hold communion with those old workers; for the whole air vibrates with a vast purpose and energy which has been and is no more. What was it? Why was it?



EXCAVATING A STATUE

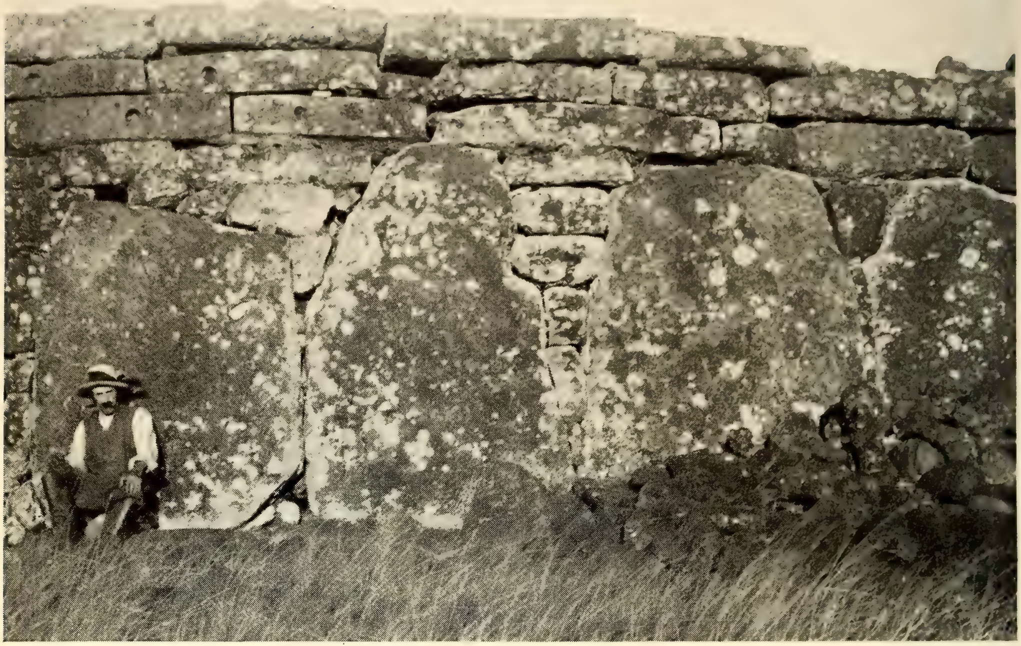
The difficulty experienced by the Routledge Expedition in unearthing some of the Easter Island statues serves to emphasize the skill of the original image-makers, who apparently employed two methods in the erection of the images. By the first, the statue seems to have been placed on its face in the desired spot, and a hole was then dug beneath the base. The other method seems to have been to undermine the base, with the face of the statue lying uppermost. In several instances a number of large stones were found behind the backs of the figures, evidently used to wedge them while being raised to a vertical position.

The great works are now in ruins; of many, comparatively little remains; but the impression infinitely exceeded anything which had been anticipated, and every day, as the power to see increased, brought with it a greater sense of wonder and marvel. "If we were to tell people at home these things," said our sailing master, after being shown the prostrate images on the great burial-place of Tongariki, "they would not believe us."

The present natives take little interest in the remains. The statues are to them facts of every-day life, in much the same way as stones or banana trees. The information given in reply to questions is generally wildly mythical, and any real knowledge crops up only indirectly.

The general form of the Easter Island image is unvarying. It represents a half-length figure, at the bottom of which the hands nearly meet in front of the body. The most remarkable features are the ears, of which the lobe is depicted to represent a fleshy rope, while in a few cases the disk which was worn in it is also indicated (see pages 634 and 635).

The tallest statues are more than 30 feet, a few are only 6 feet, and even smaller specimens exist. Those on the



AHU TEPEU, A BURIAL-PLACE COMPOSED OF SHEETS OF LAVA

The first tier of the seaward wall (see diagram on page 644) is composed of huge slabs 9 feet high. The upper portion is of wrought stones.

burial-places are usually from 12 to 20 feet in height and are crowned with a form of hat (see page 628).

"AHU," BURIAL-PLACE OF PREHISTORIC EASTER ISLANDERS

In Easter Island the problem of the disposal of the dead is supposed to have been solved by neither earth burial nor cremation, but by means of the omnipresent stones, which were built up to make a last resting-place for the departed. The burial-places are known as "ahu." They number in all some 260 and are principally found near the coast, but some 30 exist inland, suggesting that their erection on the seaboard was a matter of convenience, not of principle.

With the exception of the great eastern and western headlands, where they are scarce, it is probably safe to say that in riding round the island it is impossible to go anywhere for more than a few hundred yards without coming across one of these abodes of the dead.

They cluster most thickly in the little coves and on their inclosing promontories, which were the principal centers of population. Some are two or three hundred yards away from the edge of the cliff, others stand on the verge; in the lower land they are but little above the sea-level, while on the precipitous part of the coast the ocean breaks hundreds of feet below.

It was these burial-places, on which the images were then standing, which so strongly impressed the early voyagers and whose age and origin have remained an unsolved problem.

During the whole of our time on the island we worked on the ahu. Those which happened to lie near to either of our camps were naturally easy of access, but to reach the more distant ones, notably those on the north shore, involved a long expedition. Such a day began with, perhaps, an hour's ride; at noon there was an interval for luncheon, when, in hot weather, the neighborhood was scoured for miles to find the smallest atom of shade; and the day ended with a journey home of not less than two hours, during which an anxious eye was kept on the sinking sun.

The burial-places are not all of one type, nor all constructed to carry statues; some also are known to have been built comparatively recently. A typical image ahu (see diagram above) is composed of a long wall running parallel with the sea, which, in a large specimen, is as much as 15 feet in height and 300 feet in length. It is buttressed on the land side with a great slope of masonry.

The wall is in three divisions. The main, or central, portion projects in the form of a terrace, on which the images stood, with their backs to the sea; it is, therefore, broad enough to carry their oval bed-plates. The latter measure up to about 10 feet in length and 8 feet or 9 feet in width and are flush with the top of the wall. On the great ahu of Tongariki there have been fifteen statues, but sometimes an ahu has carried one figure only.

FOLKLORE ACCOUNTS FOR THE FALL OF THE STATUES

The only piece of a statue which still remains on its bed-plate is the fragment at Tongariki. In the best-preserved specimens the figures lie on their faces like rows of huge nine-pins. Some are intact, but many are broken, the cleavage having generally occurred when the falling image has come in contact with the containing wall at the lower level.

No one now living remembers a statue standing on an ahu, and legend, though not of a very impressive character, has already arisen to account for the fall of some of them. An old man arrived, it is said, in the neighborhood of Tongariki, and as he was unable to speak, he made known by means of signs that he wished for chicken heads to eat; these were not forthcoming. He slept, however, in one of the houses there, and during the night his hosts were aroused by a great noise, which he said was due to his feet tapping against the stone foundations of the house. In the morning it was found that the statues on the great ahu had all fallen—the revenge of the old man.

Such lore is, however, confused with more tangible statements to the effect that the figures were overthrown in tribal warfare by means of ropes, or by the displacement of the small stones underneath the bed-plates, thus causing them to fall forward. Some students still hold to the theory that the images were overthrown by an earthquake.

The conclusion, however, that the images owe their fall to deliberate vandalism during internecine warfare seems to be confirmed by comparatively recent tradition concerning the destruction of the image which stood alone on Ahu Paro on the north coast. This was the tallest known to have been erected on a terrace, being 32 feet in height, and the events which resulted in its destruction are supposed to have occurred just before living memory, and, like most stories in Easter Island, are connected with cannibalism. This is the story:

A woman of the western clans was eaten by men of the eastern. Her son managed to trap thirty of the enemy in a cave and consumed them in revenge, and during the ensuing struggle this image was thrown down.

The oldest man living when we were on the island said that he was an infant at the time; and another, a few years younger, stated that his father, as a boy, helped his grandfather in the fight.

While, therefore, the date of the erection of the earliest image ahu is lost in the mists of antiquity, nor are we yet in a position to say when the building stopped, we can give approximately the time of the overthrow of the images. We know, from accounts of early voyagers, that the statues, or the greater number of them, were still in place in the eighteenth century; by the middle of the nineteenth century not one was standing.

Strange as it may appear, it is by no means easy to obtain a complete view of a statue on the island. Most of the images which were formerly on the ahu lie on their faces, many are broken, and detail has largely been destroyed by weather.

STATUES QUARRIED FROM VOLCANIC CONE

Happily, we are not dependent for our knowledge of the images on such information as we can gather from the ruins on the ahu, but are able to trace them to their origin, though even here excavation is necessary to see the entire figure.

Rano Raraku is a volcanic cone con-

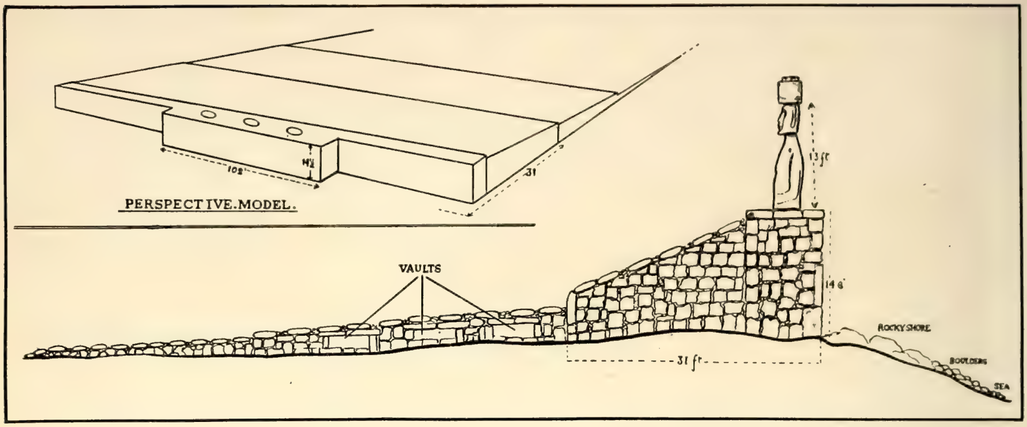


DIAGRAM OF AN IMAGE AHU: EASTER ISLAND

A long wall more than 14 feet high and 300 feet long runs parallel to the sea. It is buttressed on the land side by a great slope of masonry, beneath the surface of which are vault spaces. The ahu is in three divisions: on the central and loftiest portion stood the images with their backs to the sea; the second division slopes down to the third division or retaining wall some three feet high, composed of wrought slabs of great size and peculiar shape (see illustration on page 636).

taining a crater lake. The mountain is composed of compressed volcanic ash, which has been found in certain places to be particularly suitable for quarrying; it has been worked on the southern exterior slope and also inside the crater, both on the south and southeastern sides.

With perhaps a dozen exceptions, all the images on the island have been made from this compressed ash, and they have been dragged from this cone up hill and down dale, to adorn the terraces round the coast-line of the island. Even the images on the ahu, which have fallen into the sea on the further extremity of the western volcano, are said to have been of the same stone.

Let us in imagination scramble up the grassy side of Rano Raraku, a steep climb of some one or two hundred feet, to where the rock has been hewn away into a series of chambers and ledges.

Here images lie by the score, in all stages of evolution, just as they were left when, for some unknown reason, the workmen laid down their tools for the last time and the busy scene was still. Here, as elsewhere, the wonder of the place can only be appreciated as the eye becomes trained to see. In the majority of cases the statues still form part of the rock, and are frequently covered with lichen or are overgrown with grass and ferns.

A conspicuous image first strikes the beholder; then, as he gazes, he finds with surprise that the walls on either hand are themselves wrought into figures, and that, resting in a niche above him, is another giant; he looks down and realizes with a start that his foot is resting on a mighty face.

CRUDE TOOLS USED BY THE IMAGE-MAKERS

The tools were found with which the work had been done. One type of implement can be seen lying about in great abundance. They are of the same material as the lapilli in the statues and have been made by flaking.

Some specimens are pointed at both ends; others have one end more or less rounded. It is unlikely that they were hafted, and they were probably held in the hand when in use. They were apparently discarded as soon as the point became damaged.

There is another tool much more carefully made — an adze blade, with the lower end beveled off to form the cutting edge. These are rarely found, the probability being that they were too precious to leave at the works, but were taken home by the workmen.

The whole process of quarrying an image was not necessarily very lengthy; the calculation of the number of men who could work at the stone at the same time

A GIANT IMAGE ON ITS BACK

and the amount each could accomplish gave the rather surprising result that a statue might be roughed out within the space of 15 days.

The most notable part of the work was the skill which kept the figure so perfect in design and balance that it was subsequently able to maintain its equilibrium in a standing position; to this it is difficult to pay too high a tribute.

How shall we account for the vast number of images to be found in the quarry? A certain number had, no doubt, been abandoned prior to the general cessation of the work; in some cases a flaw has been found in the rock, and it is evident that the original plan had to be given up, although part of the stone was sometimes used either for a smaller image or for one cut at a different angle.

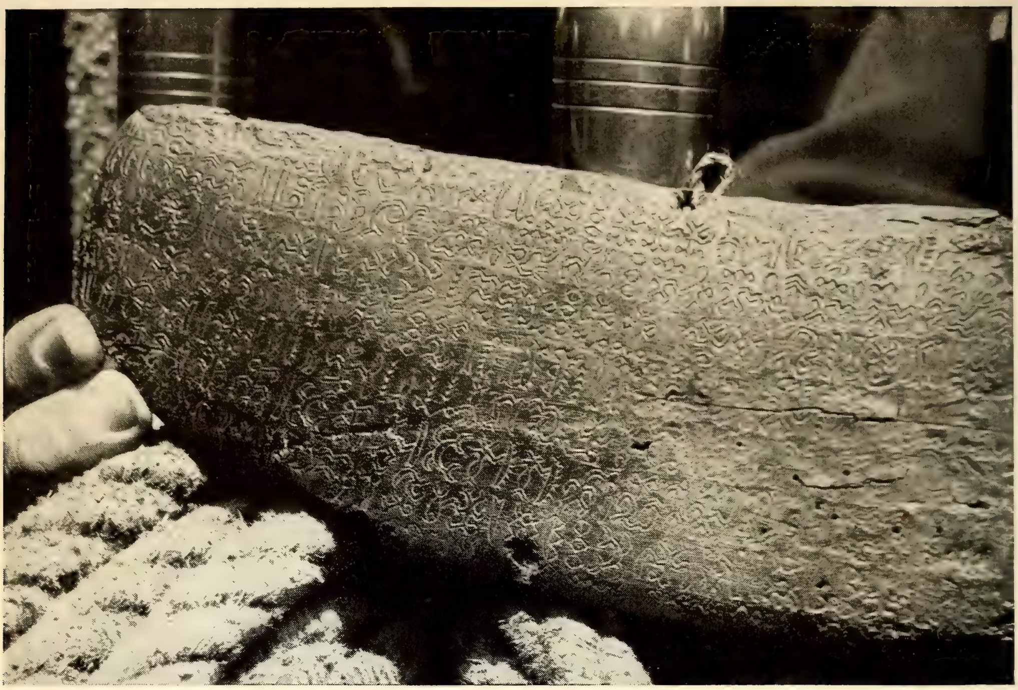
In other instances the sculptors were unlucky enough to come across, at important points, one or more of the hard nodules with which their tools could not deal, and as the work could not go down to posterity with a large wart on its nose or excresense on its chin, it had to be stopped.

But when all these instances have been subtracted, the amount of figures remaining in the quarry is still startlingly large when compared with the number which have been taken out of it, and must have necessitated, if they were all in hand at once, a number of workers out of all proportion to any population which the island ever, in all likelihood, maintained.

The theory naturally suggests itself that some of the images were merely rock-carvings and were not intended to be removed. It is one which needs to be adopted with caution, for more than once, where every appearance has pointed to its being correct, a similar neighbor has been found which was actually being removed; on the whole, however, many students agree that there can be little doubt that it is at any rate a partial solution of the problem.

Some of the images are little more than embossed carvings on the face of the rock without surrounding alley-ways. Perhaps the strongest evidence is afforded by the size of some of the statues: the largest is 66 feet in length, whereas 36 feet is the extreme found outside the quarry. Tradition, it is true, points out the ahu on the south coast as the one for which this monster was designed, but it is difficult to believe the image-makers ever intended to move such a mass.

If this theory is correct, it would be interesting to know whether the stage of carving came first, and that of removal followed, as the workmen became more expert; or whether it was the result of



Photograph Courtesy U. S. National Museum

A WOODEN CLUB FOUND ON EASTER ISLAND: ITS HIEROGLYPHICS HAVE NEVER BEEN DECIPHERED

This specimen was collected by Paymaster W. J. Thompson, of the United States Navy, on his visit to Easter Island in 1886, and deposited in the U. S. National Museum.

decadence when labor may have become scarce. It is, of course, possible that the two methods proceeded concurrently, rock-carvings being within the means of those who could not procure the labor necessary to move the statue.

LEGEND EXPLAINS WHY IMAGE-MAKING CEASED ON EASTER ISLAND

Legendary lore throws no light on the reasons which led to the desertion of this labyrinth of work, but a story has been invented which entirely satisfies the native mind and is repeated on every occasion. It runs as follows:

There was a certain old woman who lived at the southern corner of the mountain and occupied the position of cook to the image-makers. She was the most important person of the establishment, and moved the images by supernatural power (*mana*), ordering them about at her will. One day, when she was away, the workers obtained a fine lobster, which had been caught on the west coast. They ate it, leaving none for her. Unfortunately, they forgot to conceal the remains, and when the cook returned and found how she had been treated, she arose in her wrath, told all the images to fall down, and thus brought the work to a standstill.

While the scene on Raraku always awakens a certain sense of awe, it is particularly inspiring at sunset, when, as the light fades, the images gradually become outlined as stupendous black figures against the gorgeous coloring of the west.

The most striking sight witnessed on the island was a fire on the hillside. In order to see our work more clearly, we set alight the long, dry grass, always a virtuous act on Easter Island, that the live stock may have the benefit of the fresh shoots. In a moment the whole landscape was ablaze. The mountain, wreathed in masses of driving smoke, grew to portentous size. In the quarries, below the whirl of flame, the great statues stood out calmly, with quiet smiles, like stoical souls in Hades.

OUR MAP OF THE PACIFIC

WE ARE sure the readers of The Geographic will welcome with special favor the beautiful and timely map showing the "Sovereignty and Mandate Boundary Lines of the Islands of the Pacific," which is issued as a supplement to this number of the Magazine.

This is the fourth of an invaluable series of maps which have been compiled by the National Geographic Society and issued as supplements to its Magazine during 1921, a Map of New Europe having been issued in February, a New Map of Asia in May, and a New Map of South America in October.*

All of these maps have been printed in colors, on a generous scale, and represent the highest achievements in the art of cartography, the cost of compiling, engraving, and printing approximating $150,000.00.

During 1922 The Society will continue its map program, issuing a New Map of the Countries of the Caribbean in February, to be followed by new maps of Africa and of the World later in the year.

CHANGES OF SOVEREIGNTY IN THE PACIFIC

The ownership of the islands of the Pacific affords one of the most striking examples known to history of the erratic course of sovereignty.

Anxious to achieve some spectacular discovery in order to appease his sovereign, Ferdinand of Spain, whose displeasure he had incurred, Vasco Nuñez de Balboa, reckless adventurer and courageous governor of the Spanish colony of Darien, learned from his Indian friends of a vast sea lying to the west. He crossed the Isthmus of Panama and on September 25, 1513, was the first European to behold the ocean to which he gave the name, Great South Sea.

It was Magellan, the Portuguese, who in 1520 first gave the sea the name "Pacific" (El Mar Pacifico), after sailing for many weeks over its calm waters from the Straits of Magellan to one of the Tuamotu group.

With these claims to discovery and early navigation, Spain and Portugal were for many years the only rivals in the Pacific. Today Spain owns not a single palm tree nor coral rock in the great ocean, and Portugal's interests are confined solely to the eastern portion of the island of Timor, in the Malay Archipelago.

YAP ALONE A SUBJECT OF CONTROVERSY

About few of the thousands of coral and volcanic islands is there any controversy as to ownership, and of these the status of Yap alone is occasioning diplomatic discussion, due mainly to its importance as a cable station.

In the wide expanse of ocean south of the Hawaiian Islands are several isolated "specks" which are claimed both by the United States and Great Britain. Washington (or New York) and Christmas Islands were occupied by American guano companies about the middle of the last century, but were subsequently deserted; and, while the United States has never formally renounced claim to them, their guano deposits are being worked now by British companies, and the islands themselves are included in official British publications as units of the "Gilbert and Ellice Islands Colony." The proclamation annexing Christmas Island to this colony was issued as recently as November, 1919.

In like manner, the international status of Howland and Baker is in question. Palmyra is claimed both by the United States and Great Britain, but here it is the United States which has the "eleven points in the law"—possession. It was included in the Hawaiian Archipelago, and its one and a half square miles of coral rock, inhabited by three people, is now under active American administration.

OTHER ISLANDS MAY REMAIN TO BE DISCOVERED

In the vast Pacific are scattered thousands of islands, ranging from the world's smallest continent (Australia) and second largest island (New Guinea) to the tiniest solitary pinnacle of coral rock and tip of volcanic peak.

Some of its smaller islands are believed to be as yet undiscovered, especially in regions far removed from the lanes of

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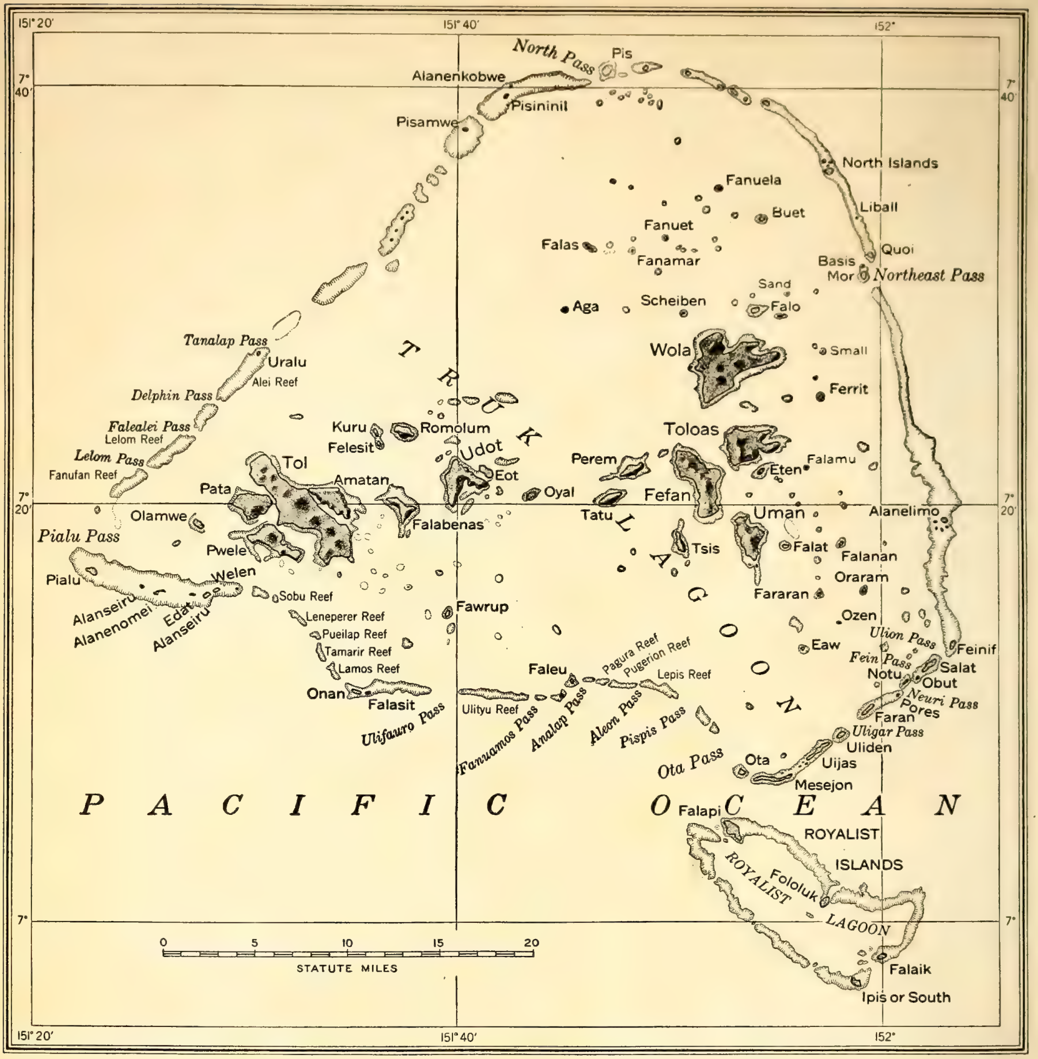
*Additional copies of any of these four maps may be obtained from the headquarters of the National Geographic Society in Washington. Cloth edition, $1.50; paper, $1.00 each.



Drawn by A. H. Bumstead

A MAP OF ONE OF NATURE'S MOST MARVELOUS CREATIONS

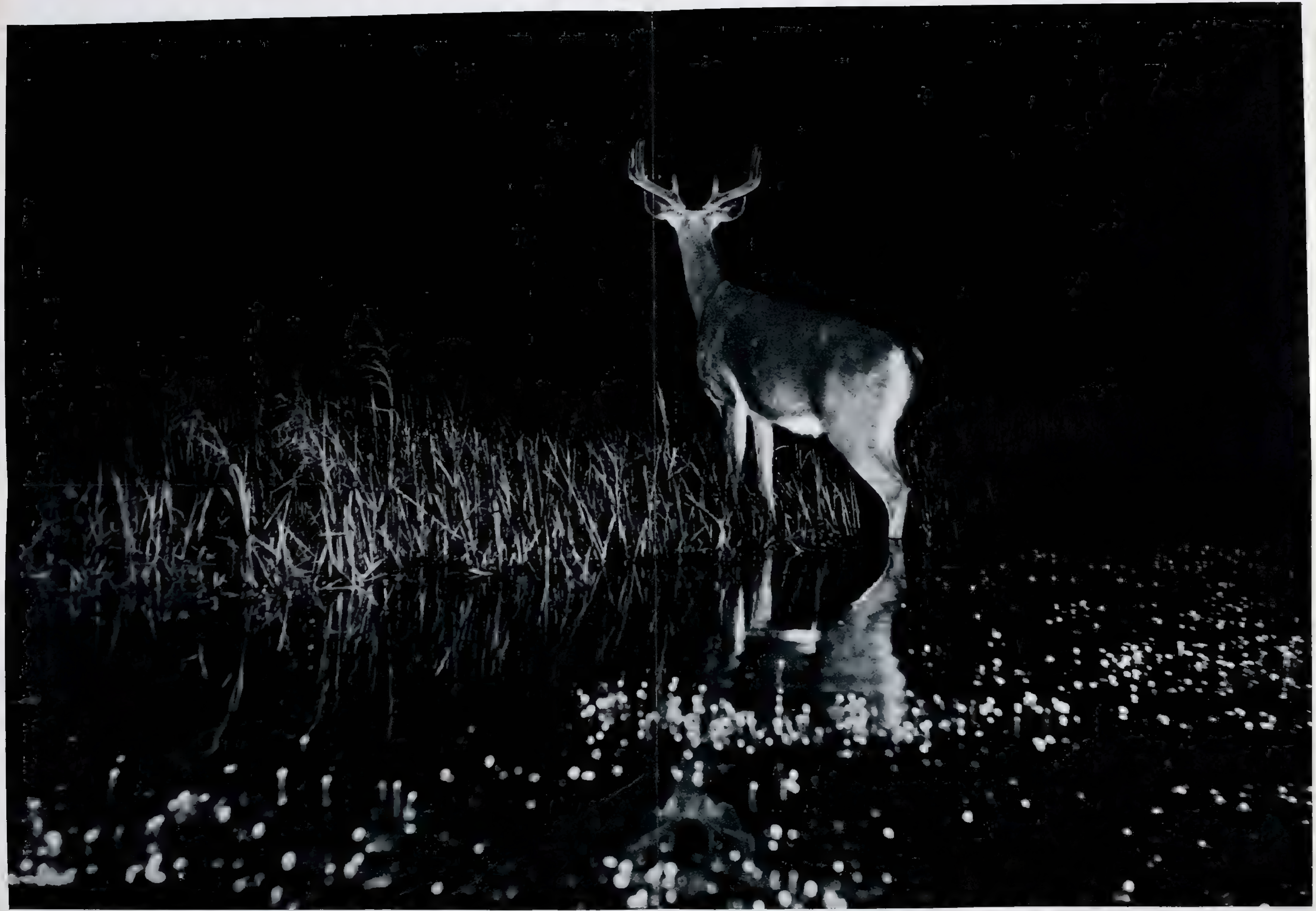
A cluster of volcanic and coral islands encircled by a protective reef of coral, 140 miles in circumference, which has been raised by myriads of minute and tender animals. Truk, Ruk, and Hogolu are the names given to this collective unit of the Caroline group (see text, page 626, and pictures, pages 601-607). Yap is a similar but smaller cluster (see page 617).

commerce, while in the coral lagoons, such as Truk, the islands within atolls multiply the number beyond all computation (see map above).

So wide are the seas and so small some of the islets that there is considerable doubt as to the existence of certain ones which have been reported but which have not been visited in many years. Among these is Walker, its apocryphal existence being indicated on the chart with an interrogation point following the name.

An effort has been made to assist the user of the map by including the native name, italicized and in parentheses, following the official name. The question of nomenclature, however, is an extremely confusing one, as indicated in Mr. Wood's article (see page 626).

In the preparation of its Map of the Islands of the Pacific, the National Geographic Society is indebted for valuable data and for constructive criticism to the Graphic Section of the Military Intelligence Division, War Department; to the Hydrographic Office, Navy Department, and to officials of the Far Eastern Division of the State Department.



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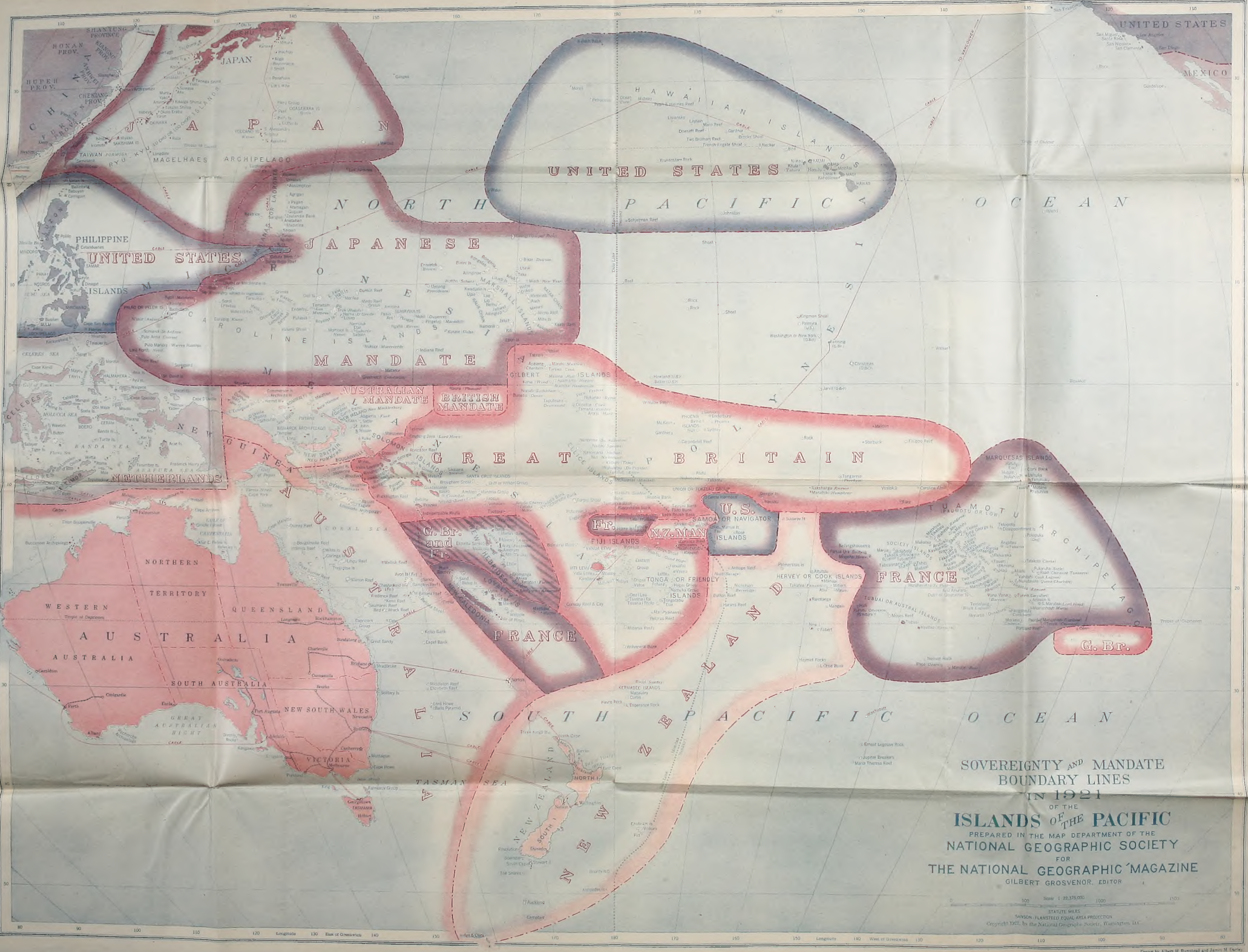
Photograph by George Shiras, 3d

HARK!

One of a group of four night pictures first establishing the beauty and accuracy of the camera and flashlight in big-game photography.



SOVEREIGNTY AND MANDATE
BOUNDARY LINES
IN 1921
OF THE
ISLANDS OF THE PACIFIC
PREPARED IN THE MAP DEPARTMENT OF THE
NATIONAL GEOGRAPHIC SOCIETY
FOR
THE NATIONAL GEOGRAPHIC MAGAZINE
GILBERT GROSVENOR, EDITOR

Scale 1: 22,375,000
STATUTE MILES
SANSON-FLAMSTEED EQUAL AREA PROJECTION

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Drawn by Albert H. Bumstead and James M. Darley

MAP OF
SOUTH AMERICA

PREPARED ESPECIALLY FOR

THE NATIONAL GEOGRAPHIC MAGAZINE

GILBERT GROSVENOR, EDITOR

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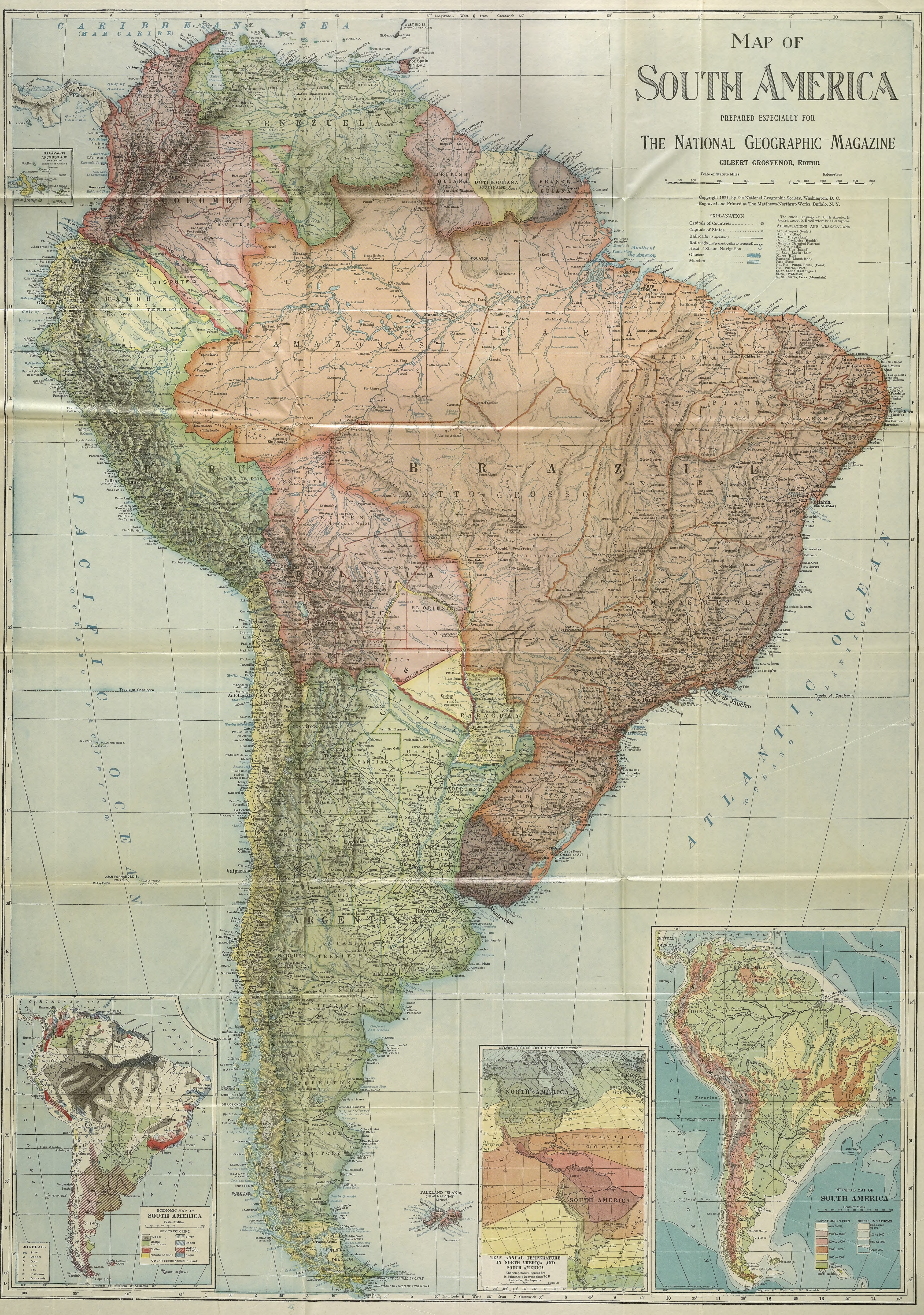

EXPLANATION

Capitals of Countries.................. ⊛

Capitals of States........................ ⊙

Railroads (in operation)..... ———

Railroads (under construction or proposed) - - - -

Head of Steam Navigation....... ⚓

Glaciers....................

Marshes....................

The official language of South America is Spanish except in Brazil where it is Portuguese.

ABBREVIATIONS AND TRANSLATIONS

Arr., Arroyo (Rivulet)
B., Bahia (Bay)
Brazo, Braço (Arm)
Cach., Cachoeira (Rapids)
Chapada (Serrated Plateau)
Co., Cerro (Hill)
I., Isla, Ilha (Island)
L., Lago, Lagôa (Lake)
Morro (Hill)
Pantanal (Marsh land)
Paso (Pass)
Pt., Pta., Punta, Ponta, (Point)
Pto., Puerto, (Port)
Salar, Salina (Salt region)
Salto, (Waterfall)
S., Sa., Sierra, Serra (Mountain)

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